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### INTESTINAL OBSTRUCTION.<sup>1</sup>

By I. B. JOSE, M.C., M.S., F.R.C.S.,  
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As a basis for this paper I have reviewed the cases of acute obstruction of the small intestine (excluding strangulated hernia) occurring at the Adelaide Hospital during the past six years. The cases were all due to mechanical obstruction of the small intestine, proved at operation or *post mortem* examination, and physiological obstruction (paralytic ileus) is not included. The series includes all the patients admitted to hospital late in the course of their illness.

The omission of the external strangulated hernia group and of cases due to large intestine obstruction

from carcinoma and diverticulitis causes a higher mortality rate than that given in many other statistical tables.

In Table I are given conclusions which appear outstanding:

TABLE I.  
The Improvement in Recovery Rate.

Year.	Cases Recorded.	Deaths.	Recoveries.	Percentage.
1934 . . . .	11	7	4	35
1935 . . . .	11	6	5	43
1936 . . . .	13	8	5	38
1937 . . . .	10	2	8	80
1938 . . . .	22	5	17	77
1939 (to September) . . . .	11	2	9	81

This improvement in the treatment of acute intestinal obstruction is general and is due mainly to a better conception of the detrimental factors and causes of mortality in acute obstruction, and to

<sup>1</sup>Read at a meeting of the South Australian Branch of the British Medical Association on October 26, 1939.

the provision of a technique following the work of Wangenstein and others, which overcomes the most serious of these detrimental factors.

The incidence of the cause of obstruction in these 78 cases emphasizes the importance of previous operative procedures as a cause of acute intestinal obstruction at some later period. The causes are analysed in Table II.

TABLE II.  
Causes of Obstruction in 78 Cases.<sup>1</sup>

Cause of Obstruction.	Number of Cases.
Adhesions causing kinking of the small intestine (non-strangulating) <sup>2</sup>	34
Adhesions causing bands strangulating a loop <sup>2</sup>	24
Intussusception	3
Volvulus (5 associated with bands and adhesions)	7
Internal hernia	2
Richter's hernia (1 obturator, 1 inguinal)	2
Gall-stone impacted or foreign body	5
Mesenteric thrombosis	1

<sup>1</sup>Strangulated external hernia, carcinoma coli and diverticulitis are not included in this series.

<sup>2</sup>The majority of the former and all the latter were old organized adhesions and practically all post-operative. The operations mainly concerned were appendectomy and operations on the pelvic organs.

Enteroanastomosis is a less hazardous proceeding since the routine use of gastric suction.

#### Diagnosis of Intestinal Obstruction.

In a diagnosis of the cause of an acute obstruction the possible causes have to be kept in mind, and the antecedent conditions leading to these causes. These may be divided into two groups: mechanical causes and non-mechanical causes.

Mechanical causes may be tabulated as follows:

##### Congenital atresias:

In various portions of the gut, from œsophagus to anus.

##### Intussusception:

Acute primary intussusception (in children mainly).  
Chronic secondary intussusception (in adults mainly).

##### Adhesions and kinking:

Following tuberculous peritonitis.  
Post-inflammatory, recent or old.  
Post-operative, recent or old.  
Distortion from external pressure of a large tumour *et cetera*.

##### Bands strangulating a loop:

Congenital (Meckel).  
Post-inflammatory.  
Post-operative.

##### Hernia:

External } either may be { Spontaneous  
Internal } { Post-operative  
Spontaneous.  
Post-operative.

##### Foreign body:

Gall-stone.  
Other foreign body.

##### Volvulus:

Acute, primary volvulus of the sigmoid, caecum or mesentery.  
Chronic, secondary to bands or adhesions.

##### Acute on chronic obstruction:

Carcinoma coli *et cetera*.  
Diverticulitis.  
Adhesions.

Non-mechanical obstructions may be tabulated as follows:

##### Paralytic:

Post-operative trauma.  
Post-inflammatory.  
Mesenteric thrombosis.  
Enterospasm.

It is important to distinguish the two types of obstruction: (i) simple mechanical obstruction to the lumen, (ii) occlusion with strangulation of the blood supply; this adds to the danger and requires more prompt surgical relief.

The symptomatology of acute obstruction is well known. When there is a recent or old operative or inflammatory cause the onset may be of two types: attacks of colicky pain, referred to the umbilicus, mild at first, may become more frequent and severe, or the onset may be sudden, with pain, shock and vomiting. When there is no known previous cause the onset is sudden, with pain, shock and vomiting.

The pain is abdominal, and is intermittent or else is characterized by waves of increased intensity.

There is absolute constipation, except that often there is a motion after the onset. No flatus is passed, and the two-enemata test elicits no faecal return.

Vomiting is persistent and is more severe the higher the obstruction. In colonic obstruction it does not occur till late.

Abdominal distension does not occur in acute strangulation, which is too rapid; but it does occur in acute volvulus. Distension is slighter or absent in the presence of a high obstruction, greater in colonic obstruction.

Important items to be noted are the following:

(i) The possible difference in the previous history between simple obstruction and obstruction with strangulation, with other clinical signs, may help to differentiate these conditions. (ii) The test of two enemata at an interval is useful; negative results (at any rate at the second test) confirm the diagnosis of obstruction, always presupposing that a rectal examination has previously been made to exclude impaction of faeces in the rectum. (iii) There are some clinical differences between obstruction high and low in the intestinal tract. Other items could be added; for example, blood and mucus are present in intussusception, and there is a mass in tumour or intussusception. The need for examination of all external hernial orifices must be stressed.

These are elementary points, but in practice they will produce their problems.

One should as a rule be able to form an opinion on these four essentials: (i) the presence or absence of obstruction; (ii) the site of obstruction, especially if it is in large or small bowel (this has an important influence on treatment); (iii) the presence or absence of strangulation; (iv) the probable cause.

If there is any doubt as to (i) the presence of obstruction or (ii) the site, the following examinations should be made: (i) an examination of the gastric contents and (ii) a plain X ray examination.

(i) The stomach contents, either vomitus or, better, the material aspirated through a duodenal tube passed through the nares, should be examined for its quantity and quality. Colon obstruction often produces no vomiting or gastric retention, and almost never faecal vomiting.

(iii) A plain X ray examination may be made with the patient in the upright position, sitting

propped up in bed, and a portable machine may be used. If the patient is very ill he may lie on his side. If the obstruction is of any duration, the appearance of retained gas and fluid reveals gas distension, and later fluid levels, in the various coils, demonstrating the presence of obstruction. The general form of these fluid level pictures often demonstrates the site, (i) by the anatomical formation—for example, there are levels at the hepatic and splenic flexures and multiple, generally smaller, levels in the small intestine, and (ii) by the fact that mucosal folds are not obliterated in distension of the small intestine (ladder pattern).

Sometimes it is possible to tell with accuracy the part of the small gut which is obstructed; sometimes it is impossible to tell distended colon from severely distended small intestine or to distinguish a late colonic obstruction from a paralytic ileus. In these cases a barium enema is given to determine whether the block is in the colon.

It is important to be sure whether the obstruction is distal to the caecum, as operative procedures will differ. Acute obstruction distal to the caecum can be relieved only by an opening into the large bowel, as the ileo-caecal valve prevents deflation of the colon by duodenal suction.

Never give a barium meal in complete or sub-complete obstruction. Nothing will more surely "bung" any passage and add to the risk of the patient and the discomfort of the surgeon. If it is essential to do so, use a small quantity only of thin barium emulsion.

Thus the use of plain X ray films, coordinated with the clinical aspects, gives valuable information. Where there is any doubt as to the presence or site of an obstruction a clinical diagnosis is incomplete if an X ray examination is omitted.

An additional aid in determining the presence of strangulation is the presence of tenderness or rebound tenderness; this was borne out very accurately in the notes of the strangulation cases in this series.

When a loop is strangulated the parietal section of the peritoneum is irritated by the exudate consequent on congestion and oedema of the loop, and so is tender on movement occasioned by release of digital pressure, as well as on the application of pressure. This is a fallacy when an inflammatory condition (for example, an appendiceal abscess) is coincident with simple obstruction. In such a case, when there is any doubt, a laparotomy must determine the differentiation. If on laparotomy blood-stained fluid is present, strangulation is probable and must be sought for.

In this way an accurate opinion on the four essential points previously mentioned should be attained—by careful appraisal of the history, careful consideration of the available criteria of physical examination and by the use of the plain X ray film.

#### The Systemic Effects of Acute Obstruction.

The theory of toxic absorption from the intestine as a cause of the ill effects resulting from an obstruction has been replaced by the following facts.

Intestinal occlusion causes retention above the site, and so presents reabsorption of fluids and chlorides. Vomiting results—excessive in high obstruction. This leads to dehydration and chloride loss (shown by the low chloride content of the blood) and a consequent alkalosis (shown by a raised carbon dioxide combining power of the blood). Clinically there follow a rapid feeble pulse and a lowered blood pressure, and finally a failure of the kidney to secrete nitrogenous waste; this is shown by a raised non-protein nitrogen level in the blood.

Long intestinal occlusion (particularly in severe distension and in low obstruction) causes increased tension with discomfort, stagnation and impairment of the viability of the gut wall. Increased tension with discomfort threatens the viability of the bowel wall and possibly increases its permeability, and may allow transperitoneal absorption of infection. Stagnation may allow bacteria to multiply, and infection of the upper sterile regions of the intestine occurs. Strangulation soon impairs the viability of the gut wall, allowing the passage of infection to the peritoneum. Where large portions of the gut are strangulated the amount of blood lost to the circulation in the infarcted segment may be considerable. Here blood transfusion is indicated.

#### Treatment.

The treatment of mechanical obstruction is early operation to relieve the block. In strangulation urgency is essential. The resultant factors of obstruction can and should be countered both before and after operation. It is by this means that reduction in the mortality rate has been brought about.

Dehydration and loss of chlorides are dealt with by the intravenous administration of saline solution given by the constant drip method. This is begun immediately, while preparations are being made for operation. The fluid is run in rapidly for the first pint and then usually at the rate of 50 to 80 drops per minute. A severely dehydrated patient needs about three litres of fluid to restore him to normal and a further three and a half litres per day. The intravenous method can be supplemented by subcutaneous infusion when necessary.

Lack of nutrition can be somewhat overcome by the addition of dextrose, 5% or more, to the saline solution, or by the alternation of saline and dextrose solutions. If these fluids are given for prolonged periods there are dangers which must not be overlooked. The quantity of salt given must be controlled by estimation of the chloride content of the blood every second day. If the content is too high, water and dextrose only are given. An excess of salt may produce oedema or pulmonary oedema. If too much fluid is given, a weak circulation may be overtaxed. The possibility of venous thrombosis and consequent embolus in continuous intravenous infusion must not be overlooked, so the point of insertion of the needle must be changed at intervals.

The distended coils above the obstruction are controlled with early relief of retention by aspiration and continued siphonage. The tube may have



been used to aspirate gastric secretion for diagnosis. If not, it is inserted before operation to empty the stomach and upper reaches of the intestine. Siphonage is maintained during operation, and subsequently further to decompress the gut until normal peristaltic flow is reestablished. This may take several days.

Even in cases of acute strangulation, in which operation should not be delayed, while the operation theatre preparations are being made, shock and collapse can be treated by a shock cradle and the giving of morphine; the intravenous administration of saline solution by the drip method is begun; gastric suction is commenced so that the stomach is emptied prior to anaesthesia, and the apparatus can be retained, if necessary, afterwards. In the more severe cases a blood transfusion should be given. This is done through the needle used for the drip administration of saline solution.

When it is certain that the obstruction is non-strangulating it is of benefit to continue this preliminary treatment for a longer period, so long as the patient's condition is improving, and according to the cause of obstruction.

It is not sufficient to rely on abatement of symptoms to infer that retention is relieved. This must be checked by frequently repeated plain X ray examinations (for example, every twelve hours) to see that the retained material is being removed. It is usually dangerous to defer operation for more than a few hours, even if the patient's condition improves as a result of his preparatory treatment. The obstructive cause must be eliminated.

In some cases, typified by those due to recent adhesions round an inflammatory mass—for example, after the combination of operative trauma and the infection of a seriously affected appendix—suction can be continued with relief of tension; the suppurative process or inflammatory adhesions may then be absorbed or subside so that the lumen of the bowel is restored. In such cases it is frequently difficult to determine whether the cause is mechanical or merely paralytic.

Again, in a few selected cases of mild obstruction (usually due to adhesions with kinking, which for some reason has caused complete occlusion) relief of the distension may relieve the block, enabling the acute condition to subside and operation to be deferred.

In paralytic ileus this combination of suction and the intravenous administration of saline solution and dextrose is the ideal mode of treatment and has obviated the need for jejunostomy and other attempted surgical measures for the relief of this serious condition. In the lesser forms of ileus (post-operative distension) it can be used with extremely good effect. The time to commence it is early, when distension is appearing and before vomiting begins; severe ileus may thus be prevented. Perhaps in a few hours the distension has subsided. In such cases concomitant administration of fluid by the intravenous drip method may be unnecessary.

However, apart from paralytic ileus, it must be recognized that gastric suction is entirely an adjuvant treatment to the early surgical relief of mechanical obstruction; but it is a very useful one, both preoperatively, to relieve the distended gut and to keep the stomach empty before and during anaesthesia, and post-operatively, further to relieve distension, frequently to obviate the necessity for such procedures as jejunostomy and "stripping" of the gut and also to protect the suture line of an enteroanastomosis.

In furtherance of the idea that the point which most needed decompression was the gut immediately above the obstructed point, Miller, Abbott and others produced the long double-lumen tube—one lumen for suction, the other to allow the inflation of a balloon at the tip, which, when filled, is gripped by peristaltic action and gradually draws the tube along the gut to the obstruction point, the various segments *en route* being aspirated with the balloon temporarily deflated. X ray control is usually necessary to be sure that the tube is on its way. We have as yet had little experience here of the advantages of the use of this tube.

#### *The Operative Treatment.*

Operative procedure must be adapted entirely to the type of obstruction and to the condition of the patient. A few guiding principles are enumerated.

If the obstruction is of recent onset and the patient's condition is good and he is not dehydrated, immediate operation to relieve the obstructing cause may be all that is necessary. The rule in severe cases is to do as little as possible. Extensive operations are hazardous in acute obstruction.

If blood-stained fluid is encountered when the abdomen is opened, one must exclude the presence of a strangulated loop, whatever the condition of the patient.

In strangulation early operation is imperative. The strangulation must be relieved however ill the patient is. If viability of the strangulated loop is affected the patient's condition must decide the procedure. "Exteriorization" of the affected loop may be better than resection for a sick person and may save his life.

In simple occlusion the cause must be released or removed. If complications make resection or anastomosis necessary the risk is increased, and the operative technique must be perfect to avoid soiling of the peritoneum.

Enterostomy is performed from necessity rather than from choice. The indications for it are the following. It is necessary in severe cases of simple obstruction when the patient is too ill for exploration; it is used to drain a very distended loop or protect a suture line or damaged gut wall. There is risk of leakage when enterostomy is performed, so the segment should be emptied and clamped off before it is opened. The Witzel method is probably the best. The preferred site is just proximal to the obstruction. Otherwise suction is better than jejunostomy.



Acute obstruction distal to the caecum must be relieved by an appropriate type of colostomy or caecostomy when the cause is not one that can be dealt with at the primary operation (for example, band or volvulus).

#### Anæsthesia.

Time does not permit me to discuss anæsthesia in intestinal obstruction; but I can recommend to you an article by Dr. Gilbert Brown, published in *THE MEDICAL JOURNAL OF AUSTRALIA* of July 29, 1939. The order of preference of anæsthetic in these cases is as follows: (i) local and regional anæsthesia, (ii) anæsthesia with a gaseous agent, (iii) spinal anæsthesia, (iv) anæsthesia by means of ether. Local and regional anæsthesia is to be used if it allows to be done readily what must be done; it is to be used in all the most severe cases. Its effective use depends largely on the skill and experience of the operator. Gaseous anæsthetic agents may be used in conjunction with local anæsthesia if extensive abdominal exploration is necessary. Spinal anæsthesia is to be used if the patient is in relatively good condition and his systolic blood pressure is over 100 or 110 millimetres of mercury. Ether is not to be used as an anæsthetic agent if it can be avoided.

### THE PRE-OPERATIVE AND POST-OPERATIVE TREATMENT OF ACUTE INTESTINAL OBSTRUCTION.<sup>1</sup>

By N. J. BONNIN,  
Adelaide.

THE mortality figures for patients with intestinal obstruction admitted to the Adelaide Hospital during the last five years have been extracted and presented by Dr. Jose in his excellent paper. The striking fall in mortality rate from 60% to 21% is due solely to more adequate pre-operative and post-operative treatment, since in other respects the management of these cases has not altered. The therapeutic measures which have brought about this great change in the prognosis of acute obstruction are duodenal suction and continuous intravenous infusion, together with the more frequent use of blood transfusion; and especially important is the realization that these measures must be instituted before operation as well as continued after it.

#### Duodenal Suction.

Duodenal suction should be begun in all cases of obstruction as soon as the diagnosis is established, and always before operation.

#### The Duodenal Tube.

In the selection of a duodenal tube the following points need attention. The lower end should be small enough to be inserted easily through the patient's nose. A tube inserted through the nose is

much more readily swallowed and causes far less distress subsequently than a tube introduced through the mouth. The tube should have a smooth outer surface to minimize irritation. An acute pharyngitis is occasionally caused by a duodenal tube. The tube should be reasonably soft and flexible, and should be about four feet in length. Very satisfactory tubes can be made by anyone at negligible cost with the aid of a punch. A four-foot length of size 5 rubber tubing is used. A half-inch length of iron wire or nail of about the same diameter as the tube is forced into one end and some twenty holes are then punched in the tube just above the weight. The holes must be smaller than the internal diameter of the tube so that no particles large enough to block the tube can enter. These home-made tubes are used throughout the Adelaide Hospital.

#### The Method of Inserting the Tube.

For the insertion of a tube the patient is partially propped up. The end of the tube, well lubricated with glycerine, is pushed into one nostril until the patient feels it in the back of his throat. He is then given water to drink from a feeding cup and the tube is gently fed in for a distance of about eighteen inches, when the end should be well in the stomach. There is no objection to giving large quantities of water during the introduction, since the water will be aspirated immediately afterwards. With a syringe of 10 or 20 cubic centimetres' capacity the stomach is now completely emptied and the condition of the patient often improves at once as the feeling of nausea disappears. In order to get the tube into the duodenum the patient is best turned on his right side and the tube is fed in at the rate of about one inch every five minutes. However, at the Adelaide Hospital it is usual to feed the tube in to about the 28-inch mark immediately and without altering the patient's position. In many cases the tube probably never enters the duodenum; but the gastric suction thus employed seems to be quite satisfactory.

Suction may now be continued, either by repeated use of the syringe at intervals of not longer than ten minutes or by means of the Wangenstein suction apparatus or one of its many modifications. The continued use of the syringe may be the safer procedure when the nursing staff of a small hospital is unfamiliar with the suction apparatus. The apparatus is, however, extremely simple, and is best regarded as an inverted syphon with an air trap at the top. The accompanying diagrams should readily explain its mode of working.

Figure I is a diagram of a simple syphon, in which fluid is drawn up the short limb of the tubing by the weight of the longer column of fluid in the long limb of the syphon. Figure II illustrates the manner in which a syphon may break down. Air has entered the system, and the height of liquid in each tube has become equal—that is, an air lock has occurred. Now the stomach contains gas as well as fluid, so that a simple syphon cannot work for long, but will break down in the manner

<sup>1</sup>Read at a meeting of the South Australian Branch of the British Medical Association on October 26, 1939.

illustrated here. Figure III illustrates a method of overcoming this difficulty. An air trap has been introduced on top of the syphon. Any gas now bubbles up into the trap, leaving the U-tube full of liquid, so that the syphon will continue working so long as there is liquid in the air trap. Figure IV

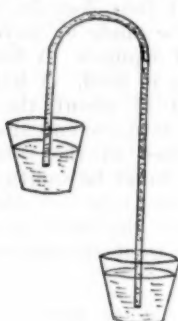


FIGURE I.

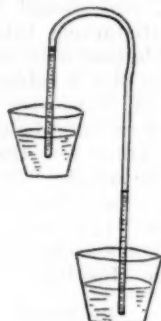


FIGURE II.

is a sketch of Wangenstein's suction apparatus. It will be noted that there is a long tube projecting above the surface of the liquid in the bottle. This acts as a valve, preventing fluid from the bottle from running back along the duodenal tube.

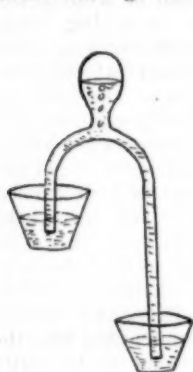


FIGURE III.

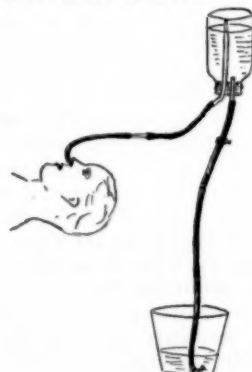


FIGURE IV.

#### *The Care of the Apparatus in Use.*

Note that in order to keep this syphon working there must be no air in the long down-tube. The points to be watched are the following. There must always be some fluid in the bottle. All fittings must be completely air-tight. The lower end of the long tube must be kept under water, so that air will be prevented from entering from below. When the bottle is being refilled or its contents are being measured, the screw clamp on the down-tube must always be turned off before the bottle is disturbed. The bottle is best suspended some two or three feet above the patient's head.

Figure V illustrates a simple modification with the bottle the right way up. This arrangement is easier to set up when the apparatus has to be improvised. Moreover, it is easier to keep going, it functions equally well, and the bottle can be stood on a table out of sight of the patient or his interested relatives. To start this apparatus the

down-tube has first to be filled from below with the aid of a funnel.

There are many other modifications; but they are mostly more complicated, and there seems little point in describing them.

While duodenal suction is being employed clear fluid is given by mouth in unlimited quantities. This fluid is sucked back at once from the stomach and thus does no harm. Moreover, it makes the patient more comfortable, it moistens his lips and tongue, washes out his stomach and helps to keep the apparatus clear, and later on quite a proportion of this fluid is passed on and absorbed by the patient before it can be sucked out.



FIGURE V.

Whenever duodenal suction is employed it is most important to know the volume of fluid lost by this means. Therefore the amount of fluid in the bucket and in the bottle to begin with, together with all fluid given by mouth, must be accurately measured and a record kept. Suppose the sum of these volumes to be  $x$  ounces. At the end of each twelve-hour period the apparatus is temporarily turned off and the volume of fluid now in the bucket together with that remaining in the bottle is measured, and the total is found to be, say,  $y$  ounces. A simple subtraction ( $y - x$ ) gives the volume of fluid aspirated from the patient's stomach during the twelve-hour period under review.

Duodenal suction is begun before the operation, continued during the operation usually by means of a syringe, and subsequently carried on for some days. The question now arises as to the best time to remove the tube. There is no set period. As the intestine recovers the fluid aspirated is seen to become cleaner, and changes from a dirty brown colour to a clear yellow. At the same time it will be noted that the volume of fluid aspirated in each twelve-hour period becomes much less. When this stage is reached the tube is not at once removed, but is clipped off for a period of, say, three and a half hours; suction is then applied for the next half hour, when the tube is clipped off again, and so on. During this time fluid is given freely by mouth as before. If after twenty-four hours it is found that more fluid has been retained than is aspirated, then peristalsis must be proceeding in the right direction and it is safe to remove the tube.

### Intravenous Infusion.

As with duodenal suction, intravenous infusion must be begun before the operation and is an essential part of the pre-operative preparation. It is continued during the operative procedure and after the operation. When duodenal suction is employed for more than a few hours, intravenous replacement of fluid is an absolute necessity, since there is no other means of introducing fluid in sufficient amounts to replace the loss.

#### *Preparation of Solutions for Intravenous Infusion.*

The preparation of safe solutions for massive intravenous injection can be carried out only in a properly equipped laboratory by a trained staff. The water used must be either doubly distilled, or come from a specially designed still, and it cannot be stored for more than twelve hours unless autoclaved under a special seal. Glassware must be chemically cleaned immediately before use, and so on.<sup>(1)</sup> Home-made solutions can cause serious pyrexial reactions, and are dangerous, and their use cannot be too strongly condemned. However, safe solutions in convenient hermetically sealed containers are now available commercially, and these should always be employed outside of large institutions.

#### *The Nature of the Solution to be Employed.*

In a case of intestinal obstruction the correct solution to use in the beginning is normal physiological saline solution, that is, a 0.9% solution of sodium chloride in water. Some authorities from time to time have recommended a hypertonic salt solution; but it must not be forgotten that these patients are suffering quite as much from the effects of dehydration as they are from chloride loss. After the first two or three litres of fluid have been given the nature of the infusion should be properly determined by reference to the chloride and protein levels in the serum and to urine analysis; but it has been found at the Adelaide Hospital that the injection of alternate litre flasks of saline solution and a 5% solution of glucose in water (not in saline solution) maintains in the average post-operative case an approximately correct water and salt balance. If saline solution alone or glucose in saline solution be used continuously, the patients suffer from intense thirst, and oedema may occur. The glucose supplies needed calories and checks any tendency to starvation acidosis.

#### *The Amount of Fluid to be Given and the Rate of Administration.*

In the first instance a dehydrated patient, as a rough average, requires about three and a half litres of fluid (6% of body weight)<sup>(2)</sup> to restore the normal amount of body fluids, and the first litre can be run in quite rapidly with safety. Subsequently the infusion should be administered at from 40 to 80 drops per minute. The average patient will require some three and a half litres every twenty-four hours.<sup>(2)</sup> There are other guides to the amount needed. The total fluid intake should exceed the total measured fluid loss by about one to two litres every twenty-four hours, to allow for loss via the

skin and lungs. The most important single guide is the amount of urine excreted, and generally fluids should be given until the normal 50 ounces of urine are excreted every twenty-four hours.

#### *The Apparatus and Technique of Administration.*

The fluid should be given by gravity through a drip tube with a screw clamp control on the rubber tubing. The injection can usually be made by means of a needle inserted into a vein; but if the veins have collapsed or if any other difficulty is encountered, there should be no hesitation about cutting down on a vein and inserting a cannula. A small scar must not be weighed in the balance with the patient's life. If possible the injection should be made into a leg, because this method renders the nursing of the patient easier. It is best to use a vein away from a joint, so that slight movements of the patient will not disturb the needle; in the upper extremity the needle should be inserted into the back of the hand, a vein in the forearm, or even the cephalic vein in the arm, but if possible not the veins in front of the elbow. In the leg the saphenous vein is invariably employed. It is not wise to use a varicose vein, as thrombosis too readily occurs. The infusion should be continued until the patient is capable of taking sufficient fluid by mouth. It is usually not possible to continue the injection in the one vein for more than two or three days.

Some authors advise that the site of injection be changed every twenty-four hours to avoid the troublesome thrombosis which sometimes occurs after prolonged injections of these solutions. This thrombosis is usually not infective, but is due to the chemical irritation of the injected solution. Glucose solutions are especially likely to cause this trouble.

*The Care of the Apparatus in Use.*—When the apparatus is being set up care should be taken that there is sufficient fluid in the drip tube, and any air bubbles in the delivery tubing should be got rid of. At the beginning of the injection it is a good plan to run in one or two ounces of solution as rapidly as possible, to flush out any blood from tubing or needle. While the apparatus is running, the rate of flow should be counted at least every half-hour by the nurse. There should always be a full flask of solution standing by so that there will be no delay in replacement. Such delay is likely to result in obstruction due to a clot in the needle, and the injection would then have to be given through another needle into another vein. Should the solution stop running, the apparatus should be first checked over to see that all joints are air tight and that there are no kinks in the tubing. Next, the limb into which the infusion is being given should be examined for the presence of constricting bands pressing on the veins. A splint is often used to immobilize the limb into which the injection is given, and the encircling bandage proximal to the needle is a very common cause of trouble. It is much better to avoid the use of a splint altogether. Sufficient immobilization is easily obtained by means of a clove hitch round ankle or wrist.



*Complications of Intravenous Infusion.*

Rigors are due to the administration intravenously of bacterial toxins, and never occur with properly prepared solutions. Severe and dangerous rigors may occur when home-made solutions are used. The toxins concerned are the product of certain river water bacteria. These organisms can multiply in distilled water and are commonly present in any stored water. Boiling, or even autoclaving, does not destroy the toxins.<sup>(3)(4)</sup>

Phlebitis has already been mentioned. It is usually non-infective and is, as a rule, not a serious complication.

Pulmonary oedema may occur if large quantities of liquid are run in too rapidly. There is, however, no danger at all on this score if fluids are given in proper amount and at the proper rate. The amount of fluid given in each twelve-hour period should be controlled by the fluid balance and the urinary output.

Oedema sometimes occurs after the infusion has been continued for some days. Provided gross cardio-vascular or renal disease is excluded, there are two factors which may be responsible: they are the administration of too great an amount of sodium chloride, together with the presence of a low protein level in the serum. To avoid the administration of too much sodium chloride, alternate flasks of a 5% solution of glucose in water and of normal saline solution are advised after the first two or three litres of saline solution have been given. A serum protein estimation should be carried out if oedema occurs. If the protein level is found to be below normal, then blood transfusion is indicated.

*Blood Transfusion.*

Blood transfusion may be employed either before, during or after operation. It is indicated chiefly in cases in which strangulation of the intestine is present—that is, when there has been serious exudation or actual blood loss, or severe shock. Blood transfusion is especially indicated for the patient whose condition is not satisfactory several days after operation. In these cases there may be a low protein level in the serum, and the transfusion produces a remarkable improvement. The blood should be administered to the patient through the intravenous infusion apparatus already in place. It is advisable to include a gauze filter somewhere in the delivery system when blood is being given.

*Summary of Treatment.*

In a case of intestinal obstruction, as soon as the diagnosis is established pre-operative treatment is begun. Continuous duodenal (or gastric) suction is started, intravenous infusion of normal saline solution is instituted, the first litre being run in rapidly if the patient is dehydrated. If the patient's temperature is below normal he is warmed, preferably by an electric heat cradle, and morphine may be given. The treatment rarely entails a delay of more than an hour, or at most, two hours, before operation. One warning is necessary: the remarkable improvement in the patient's condition should

not mislead the surgeon into deferring operation, unless it is certain that strangulation is not present.

The best time for operation is a matter for the surgeon's judgement. As a general rule, it should be performed as soon as the patient is fit for it. But the patient should have before operation at least one pint of saline solution intravenously, his stomach should be completely empty, and his temperature should have been raised to normal.

After operation duodenal suction and intravenous infusion should be continued until intermittent cessation of suction shows that fluids can be satisfactorily absorbed from the intestine. Blood transfusion may be indicated early to combat shock and may be even more useful a few days after operation.

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# HÆMOLYTIC STREPTOCOCCAL INFECTIONS FOLLOWING CHILDBIRTH AND ABORTION. I: DETERMINATION OF VIRULENCE OF GROUP A STRAINS.

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LANCEFIELD's precipitin test enables one to distinguish that group of hæmolytic streptococci most dangerous to man; but there is still lacking a recognized and simple method of determining the degree of virulence of individual Group A strains. In connexion with puerperal and abortal infections, Lancefield and Hare<sup>(1)</sup> (1935) maintained that "Group A streptococci, if present in the vagina post-partum, almost always gave rise to serious puerperal infection". But our experience at the Women's Hospital, Melbourne, during the last two years has shown that of the women who yielded a pure or almost pure culture of *Streptococcus hæmolyticus* Group A from the vaginal swabbing, more than half showed the symptoms of only a mild infection.

The failure of our results fully to confirm Lancefield and Hare's statement is most readily explained on the assumption that different Group A strains vary considerably in their ability to produce severe human disease.

In this paper are reported attempts to devise a simple means whereby the likely course of a Group A puerperal infection could be determined in the initial stage of the illness.

In general the severity of a particular infection depends on two factors: the resistance of the patient and the virulence of the infecting strain. Hare<sup>(2)</sup>

(1934) showed that strains of hæmolytic streptococci from severe cases of puerperal sepsis differed from strains from mild cases in their behaviour in normal blood. He also<sup>(3)</sup> (1935) showed that differences in the bactericidal power of the patient's blood was not an essential factor in determining whether or not a streptococcal puerperal infection remained localized.

This work suggests the probability that the virulence of the infecting strain is the important factor in determining the severity of these infections.

It seemed possible, therefore, that a study of the characteristics of Group A strains might reveal a correlation between the severity of the infection and the nature of the infecting strain.

In 1937, when the characteristics of Melbourne strains of hæmolytic streptococci were being studied, two points were noted. First, some Group A strains grew on 40% bile blood agar; such strains were associated with very mild puerperal and abortal infections. Secondly, Group A strains obtained from blood cultures showed colony forms differing from those of most strains isolated from the vagina in mild cases of puerperal sepsis.

Since that time all Group A strains from puerperal and abortal infections have been studied with a view to the development of a method whereby the strains most likely to give rise to severe infections could be determined.

Hare<sup>(2)</sup> (1934) showed that hæmolytic streptococci from severe and fatal cases of puerperal sepsis could usually multiply in normal human defibrinated blood, whereas strains from mild localized infections could not do so. This work was done before Lancefield's method for the grouping of the hæmolytic streptococci was published; but subsequent papers from Queen Charlotte's Hospital indicate that most of these strains must have belonged to Group A.

Ward and Lyons<sup>(4)</sup> (1935) found that the hæmolytic streptococci isolated from the blood and from localized infections in man were able to resist phagocytosis in infant's blood if grown for a short time in undiluted human serum, whereas strains which had not been obtained from active lesions were unable to do so. These latter strains were obtained chiefly from throats, and many were probably not members of Group A.

The measurement, therefore, of the various grades of resistance to phagocytosis in normal human blood should be a satisfactory means of measuring the potential invasiveness of Group A strains. But this method requires more time than is usually available in hospital laboratories. We have used it only occasionally in order to confirm the simpler tests.

Recent work on the hæmolytic streptococci has shown that in certain phases young cultures of these organisms are capsulated. [Seastone<sup>(5)</sup> (1934), Dawson and Olmstead<sup>(6)</sup> (1934), Ward and Lyons<sup>(4)</sup> (1935).] Although it could be assumed on analogy with experimental infections in animals that the presence of a capsule would render streptococci more virulent for man, there appear to have been but few

attempts to determine what proportion of hæmolytic streptococci from human sources are capsulated.

Seastone<sup>(5)</sup> (1934) examined 49 throat strains; 15 were heavily capsulated, four to a lesser extent, and 30 not at all. But no information was given as to the type of lesions associated with the presence of the various streptococci. Seastone also noted a relationship between the presence of capsules and the type of growth in serum broth. Eighteen of 19 capsulated strains gave uniform growth in 20% horse serum after ten hours' incubation, whereas 29 of 30 non-capsulated strains gave a granular growth.

Dawson and Olmstead<sup>(6)</sup> (1934) observed that hæmolytic streptococci from human infections were divisible into two chief types on the basis of colony form: the mucoid and the smooth. They found that the mucoid variants were capsulated and gave rise to acute and fulminating infections, while the strains giving smooth colonies were associated with milder and more chronic disease.

Ward and Lyons<sup>(4)</sup> (1935) stated that there was a close association between certain colony forms and the presence of capsules. Cultures growing as mucoid colonies were heavily capsulated; strains giving rise to what these writers termed "F" colonies, although capsulated, showed less capsular material than the mucoid type. Strains which gave smooth conical colonies were not capsulated. Both the mucoid and the "F" varieties resisted phagocytosis in infant's blood, and both types were obtained from lesions in the human subject. The authors stated that there was no evidence from their material that the heavily capsulated mucoid variants were associated with more severe infections than the "F" variety.

In 1938 Ward and Rudd stated that strains giving rise to the "F" colony form were not capsulated. It was also stated that capsulated Group A strains produced feathery semi-transparent colonies in a special serum peptone agar, while non-capsulated strains produced compact colonies in this medium. In a footnote to an article published by Rudd, White and Ward<sup>(8)</sup> in March, 1939, it was stated that with freshly isolated strains there was no correlation between "feathery colonies" and capsulation.

The work quoted strongly suggests that the invasive properties of hæmolytic streptococci depend on their resistance to phagocytosis, which, according to Seastone and Ward and Lyons, is usually associated with the presence of capsules. Further, these authors held that capsulated strains usually showed distinctive growth forms. This suggested that a study of the growth characteristics might serve our purpose. Although a particular character may not be the factor responsible for invasiveness, if it is regularly associated with that property its detection will serve as well as recognition of the invasive factor.

It was originally intended to test the strains for the "spreading factor" described by Duran-Reynals<sup>(9)</sup> (1933). This worker found that extracts or filtrates of broth cultures of certain streptococci increased the permeability of the tissues and thus

facilitated the spread of the organisms. But in 1937 Pradham,<sup>(10)</sup> working with a Group C strain, showed that in filtrates of young broth culture the active principle which increased bacterial spread was the capsular material which had become separated from the streptococci. Pradham appears to have been satisfied that he and Duran-Reynals were dealing with the same phenomenon.

It has been suggested that the fibrinolytic activity of Group A streptococci is one of the factors contributing to their invasive character. It appears unlikely that this property is of great importance. Many Group C strains, and also some strains belonging to Group G which are usually without invasive power for the human subject (judging from the rapidity with which they are phagocytosed in whole blood), are able to dissolve human fibrin. Observations on the rapidity with which the various Group A strains dissolved human fibrin did not suggest that a study of this property would enable one to predict the severity of infection.

The amount of hæmolysin produced by individual strains, as judged by the zones of hæmolysis on horse blood agar plates, has not proved an accurate guide for prognosis in puerperal infections.

Griffith's typing must also be considered as a possible means of determining the probable severity of individual infections. Gunn and Griffith<sup>(11)</sup> (1938) found evidence of a correlation between the serological type of streptococcus and the severity of the scarlatinal attack and the occurrence of complications. The observations here recorded, although not very extensive, suggest that possibly a similar correlation exists for puerperal streptococcal infections. But at the present time this technique is usually beyond the scope of hospital laboratories; furthermore, many of the puerperal fever strains do not belong to the established Griffith types.

#### Growth Characteristics.

Several workers have shown that the appearance of streptococcal colonies is partly dependent on the nature of the medium. Griffith<sup>(12)</sup> (1938) drew attention to the need for sufficiently moist plates for the development of the watery mucinous type of colony, and Dawson and Olmstead<sup>(6)</sup> (1934) showed the advantage of using neopeptone in the medium in order to obtain characteristic and stable colony form. More recently, Ward and Rudd<sup>(7)</sup> (1938) described a neopeptone blood agar plate in which the amount of agar is reduced. These plates contain horse serum in addition to the added horse blood. According to these workers, the serum used must not be more than six weeks old, in order to avoid masking of the typical colony forms.

Ward and Rudd also described a special serum agar medium, in which Group A strains usually produced either compact or feathery semi-transparent colonies.

Since June, 1937, at the Women's Hospital, Melbourne, a study has been made of the growth characteristics of all the Group A strains isolated from cases of puerperal or abortal sepsis

in which such streptococci were the predominant organisms in the vaginal cultures. Up to the end of July, 1939, there were 101 such infections. In those cases in which the infecting organism was also obtained from blood cultures, repeated vaginal cultures *et cetera*, no difference was observed between the various strains from the same patient. We have, therefore, recorded the results for only one strain from each case.

Seventy-five of the strains were examined within twenty-four to forty-eight hours of isolation; the remaining 26 had been stored in the refrigerator (either in meat broth or on blood agar slopes) for periods up to twelve months before their cultural characteristics were recorded.

Twenty strains have been tested for colony form on five different occasions during a period of nine months. No change in the cultural characteristics was observed. For this reason both the strains which were studied immediately after isolation and those which had been stored in the refrigerator are considered together.

Using the special blood agar plates of Ward and Rudd, we observed four types of surface colonies: (i) "F" colonies (70 strains), (ii) mucoid colonies (six strains), (iii) smooth conical colonies (17 strains), (iv) large, slightly raised, rough or dull colonies (eight strains).

In shape the fourth variety of colony resembled the mucoid, but was more coherent; in this latter respect it resembled the "F" form.

Table I shows the relationship between these various surface colony types and the clinical condition of the patients from whom they were isolated.

TABLE I.

Classification of Case according to Patient's Clinical Condition.	Number of Cases.	Colony Form.			
		"F."	Mucoid.	Conical.	Large, Flat, Rough.
Mild .. ..	73	60	0	12	1
Moderately severe	16	9	2	2	3
Severe and fatal	12	1	4	3	4

The cases were classified as mild, moderately severe, or severe, according to the general clinical condition of the patient. This classification was not anatomical; the considerations on which it was based are discussed elsewhere.<sup>(13)</sup> The high proportion of mild infections in this series was not due to the administration of sulphanilamide. In only 14 of the 73 mild cases was this drug employed.

The results given in Table I suggest that strains giving "F" colonies on the plates do not usually produce severe infections, whereas the mucoid strains and those growing as flat rough colonies are generally associated with a grave clinical picture. The position in regard to conical colonies is not clear.



The type of colony form produced in the special serum agar of Ward and Rudd has not given much further information. All but two of the 70 "F" variants gave compact colonies, including the 10 strains which were associated with infections other than mild. The six mucoid strains and the eight strains growing as large, flat, rough colonies on the surface plates, only one of which was from a mild case, gave feathery colonies. Of the 17 strains giving conical colonies, 10 produced feathery and seven compact colonies. Of the latter seven, six were from patients who were only mildly ill; but six of the strains giving feathery colonies were also from mild infections.

Similarly, the type of growth in serum broth did not prove wholly satisfactory. Although in general strains giving diffuse growth were from severe or moderately severe infections, while those growing flocculently in serum broth were from women who were only mildly ill, there were important exceptions. Three strains from mild cases which gave conical colonies on the surface plates grew diffusely, and nine (including the one from a fatal case) of the 10 "F" strains which were associated with infections other than mild, grew flocculently.

#### Growth on 40% Bile Agar.

The great majority of Group A strains described in the literature have failed to grow on blood agar plates containing 40% bile. Of the 101 strains dealt with in this paper, 15 grew on such plates. These 15 strains were associated with mild infections only; two of them produced conical colonies on the special blood agar plates and feathery colonies in the special serum agar of Ward and Rudd.

#### Encapsulation.

The isolation from a fatal case of a strain giving "F" colonies on blood agar plate, compact colonies in the special serum agar and flocculent growth in serum broth, made it clear that the colony forms studied were not enough to enable one to foretell the course of an infection. Since then we have examined 71 strains for the presence of capsules. Young serum broth cultures were used to inoculate freshly defibrinated human blood, from which, after half an hour to one and a half hours' incubation, blood films were made. The films were stained with Leishmann's or Wright's stain (see Seastone,<sup>(5)</sup> 1934, Ward and Rudd,<sup>(7)</sup> 1938). Of 71 strains examined, 14 were heavily capsulated, eight showed a small amount of capsular material, and 49 were encapsulated. The capsular material was very fragile and readily separated from the cocci. It was not possible to demonstrate capsules with any of these strains when the cultures were twelve or more hours old.

Table II shows the relationship between surface colony form, encapsulation and the clinical condition of the patient.

Thus all but six of 49 non-capsulated strains were associated with mild infections, while the 14 heavily capsulated strains were from severe or moderately severe cases.

TABLE II.

Colony Form.	Capsules.	Number of Strains.	Classification of Case.
"F" .. .. .	Absent.	43	38 mild. 5 moderately severe.
	Small.	4	1 mild. 3 moderately severe.
	Large.	2	1 moderately severe. 1 fatal.
Mucoid .. .. .	Large.	6	1 moderately severe. 2 severe. 3 fatal.
Conical .. .. .	Absent.	6	5 mild. 1 fatal. <sup>1</sup>
	Small.	3	2 mild. 1 moderately severe.
	Large.	2	Severe.
Large, flat, rough ..	Small.	1	Fatal. <sup>2</sup>
	Large.	4	3 moderately severe. 1 severe.

<sup>1</sup> Cause of death, endocarditis.

<sup>2</sup> Infection with anaerobic streptococci also present.

#### Strains from Blood Cultures.

In 12 cases streptococci were cultivated from the blood. Nine of these strains were heavily capsulated, two were slightly capsulated and one was uncapsulated. The heavily capsulated strains were all from typical cases of acute infection.

One slightly capsulated strain was obtained from a patient whose illness was only moderately severe. In this instance the invasion of the blood stream followed curettage when the patient was afebrile; the resulting illness subsided in eight days without treatment with sulphanilamide.

The other slightly capsulated strain and the non-capsulated strain were from fatal cases, in neither of which could the fatal outcome be attributed primarily to the invasiveness of the streptococcus.

This second slightly capsulated strain was associated with a post-abortion infection; anaerobic streptococci were also cultivated from the blood. The hæmolytic streptococci which had appeared in the blood stream following curettage did not persist, whereas the anaerobic streptococci did. The latter weeks of this patient's illness were typical clinically of an anaerobic streptococcal infection.

The non-capsulated strain was cultivated from the blood of a woman who suffered from endocarditis following abortion. This case, notes of which are given in the appendix, had certain unusual features which place it in a different category from the majority of fatal puerperal and abortal Group A infections. In this instance, as a result of the

endocarditis, there was present a focus from which the organisms were continuously disseminated into the blood stream; this focus was situated at a distance from the original site of infection. An endocarditis associated with a Group A infection is very rare (Fry,<sup>(14)</sup> 1938). In our experience the only other cases of endocarditis due to hæmolytic streptococci have been caused by Group B strains.<sup>(15)</sup>

Ten strains which had been isolated from the blood of fatal Group A puerperal infections observed before June, 1937, or outside the Women's Hospital, were also examined for capsules. Although these strains had been preserved for periods from six months to two years, it was possible to demonstrate capsules with each strain.

#### Resistance to Phagocytosis.

The ability of strains to survive and multiply in human blood was tested according to the technique of Hare.<sup>(2)</sup> Five uncapsulated "F" variants from mild cases and a slightly capsulated "F" variant which was isolated from a woman who was moderately ill, were unable to survive in freshly defibrinated human blood, whereas the capsulated "F" variant which gave rise to a fatal infection grew readily. Six other capsulated strains, growing as mucoid or large, flat, rough colonies, were also able to survive in human blood. These six strains were associated with severe infections.

Smears, made usually after half an hour's incubation at 37° C. from a mixture of defibrinated human blood and young serum broth culture, showed that the heavily capsulated strains were phagocytosed very slightly, if at all, while the non-capsulated strains were readily taken up by the leucocytes.

#### Fibrinolytic Activity.

We did not obtain evidence of a correlation between the rapidity with which a particular strain digested fibrin clot from human blood and the severity of the infection produced by that strain. Fourteen Group A strains associated with mild infections and twelve strains from severe or moderately severe infections were tested under the same conditions. Among the former group the average time taken to digest the clot was two hours; among the latter, two and a quarter hours.

#### Hæmolysin Production.

In general, it was found that strains producing "F" colonies on the special blood agar plates gave smaller zones of hæmolysis than strains giving mucoid, conical or large, flat, rough colonies. But some of the most hæmolytic strains were those which gave smooth conical colonies, which strains were not regularly associated with severe infections.

#### Griffith Typing.

At the present time the usefulness of Griffith typing as an aid to prognosis is limited, since many strains isolated from puerperal and abortion infections do not fall within the recognized Griffith types.

Dora Colebrook<sup>(16)</sup> (1935) was able to type 96 out of 136 strains of hæmolytic streptococci from

unselected cases of definite puerperal infection; but Shaw<sup>(16)</sup> (1937) found that only 46 of 87 strains from cases of puerperal and abortion sepsis belonged to the established types.

Through the kindness of Dr. E. V. Keogh, of the Commonwealth Serum Laboratory, and Miss M. Phillips, of the bacteriology department of the University of Melbourne, we were able to have 68 strains tested with Griffith type sera. Thirty-eight belonged to the types recognized by Griffith. Additional work by Dr. Keogh on the establishing of new serological types among local strains showed that nine of the untyped strains belonged to two new serological types.

Although the value of Griffith typing is at present limited by the many strains which cannot on isolation be allotted to a known serological type, our records suggest that there is some correlation between certain serological types and severity of infection. Type XXII strains were isolated from 18 patients, all but one of whom were only mildly ill. Similarly, six patients were infected with a serological type "Woodbury", and none of these infections was severe. In these instances the groups of cases constituted small epidemics.

In the four months ending June, 1939, there were eight puerperal infections due to Type XXVII. Not one of these women was more than mildly ill. These infections did not appear to originate from the one source. In 1935 an epidemic of six fatal infections occurred in this hospital. Five of these strains were of the same serological type. The number of cases we have studied is at present too small to enable us to determine whether a similar relationship exists for infections of the same serological type which are widely separated in space or time.

#### Discussion.

The study of 101 Group A strains causing puerperal or abortion infection has shown that in this series it was possible to establish a relationship between certain properties of the strains and severity of infection.

The demonstration of capsules in young cultures established the most reliable correlation between severity of infection and the nature of the infecting strain.

In general, capsulated strains gave rise to severe invasive infections, while the non-capsulated varieties were associated with the mild cases. This correlation was in agreement with the ability of the strains to resist phagocytosis in freshly defibrinated human blood. The capsulated organisms were usually resistant to phagocytosis and were able to multiply in such blood, whereas the non-capsulated strains were readily taken up by the leucocytes.

The colony form on surface plates and in "sloppy" serum agar and the type of growth in serum broth also served to distinguish strains from severe cases from strains causing mild infections. But the correlation was not so good as that resulting from the demonstration of capsules.

Fibrinolytic activity and hæmolsin production did not prove of value in distinguishing the strains from the various types of cases. Griffith typing was of only limited value, owing to the many strains which fell outside the established types.

The results obtained show that in this series the capsulated strains were possessed of far greater capacity to invade the tissues and set up an acute generalized infection than were the non-capsulated organisms. This is well shown by the strains from blood cultures. Of 22 such strains, 21 were capsulated in young cultures.

This finding agrees with the observation of Dawson and Olmstead<sup>(6)</sup> (1934) that acute and fulminating infections were due to capsulated strains.

White, Rudd and Ward<sup>(17)</sup> (1939), from a study of scarlet fever, expressed the view that capsulated strains showed a greater degree of infectivity; but they did not believe that non-capsulated organisms were less virulent than the capsulated strains once the tissues were infected.

Our results suggest that in puerperal sepsis the capsulated strains are far more virulent than the non-capsulated strains. The non-capsulated strains, although certainly capable of infecting the tissues, lacked sufficient virulence to cause severe or fatal invasive infections.

In regard to capsulated strains having a greater degree of infectivity, we have not obtained evidence of this in puerperal infections. In 1936 there occurred at the Women's Hospital an epidemic of five fatal infections due to a capsulated strain. These cases occurred over a period of five weeks. This distribution of cases was very similar to that observed in December, 1937, and January, 1938, when five infections due to the non-capsulated type "Woodbury" occurred in four and a half weeks. One case of infection due to this type had occurred one month earlier. In May of this year there occurred six mild puerperal infections due to a non-capsulated type, all of which occurred within seven days.

We believe that the examination of Group A strains for the presence of capsules in young cultures, either alone or in conjunction with observations on resistance to phagocytosis and colony form, should usually enable one to predict the probable severity of a puerperal infection within twenty-four hours of the isolation of the strain from the vaginal swab. If the demonstration of capsules alone is relied upon, a report can often be made within six to seven hours of detection of the growth of a Group A strain. In many instances it has been possible to determine the group and the presence or not of capsules within twenty-four hours of taking the vaginal swab.

#### Summary.

A study of Group A strains isolated from puerperal and abortal infections has shown a satisfactory correlation between severity of infection on the one hand and encapsulation and certain cultural characteristics on the other.

It is suggested that observation of these characteristics would afford a means of determining the probable severity of a puerperal Group A infection in the initial stage of the illness.

#### Acknowledgements.

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#### Appendix.

E.G., aged thirty-four years, suffered from cough, sweats and high fever in the twenty-eighth week of her third pregnancy. After one week of illness she felt a bubbling sensation in her abdomen and fetal movements ceased. Thirty-six hours later she was delivered of a stillborn fetus in caul, and when seen by a medical man a few hours later she was jaundiced, feverish, and complained of headache and diarrhoea. There was not any history of interference.

On her admission to hospital on the tenth day of her illness she was fairly deeply jaundiced, with mental torpor, a pulse rate of 138 per minute and a temperature of 103° F. Her respirations were rapid and her cheeks flushed; the urine was scanty and contained urobilin. Cultures made on her admission to hospital from the blood and the vagina yielded *Streptococcus hæmolyticus* Group A. *Bacillus coli* in small numbers were present in the urine.

In view of her jaundice she was provisionally regarded as suffering from a *Bacillus welchii* infection and was treated by the continuous intravenous administration of saline solution, alkalis and *Bacillus welchii* antitoxin. This treatment was replaced by sulphanilamide on the day after her admission to hospital, as a result of the bacteriological findings. Cultures made from the throat and from sputum on the second and third days failed to yield hæmolytic streptococci. Cultures from the urine on the third and fifth days yielded small numbers of *Bacillus coli*. Blood cultures made on the fourth and sixth days still yielded hæmolytic streptococci.

The day after her admission to hospital there were crepitations without signs of consolidation at the base of the right lung. The patient remained mentally torpid; her temperature varied from 101° to 104° F., and her pulse rate from 112 to 140 per minute, while the jaundice steadily deepened, though never to the shade of mahogany. On the sixth day she died.

*Post mortem* examination revealed acute infective endocarditis of the mitral valve.

The skin and organs were fairly deeply jaundiced. The heart was of normal size, with thick musculature. The whole mitral ring was studded with numerous flat warty vegetations; the other valves were intact. The lungs were emphysematous in parts, with hypostasis and a few airless infiltrated areas in the lower lobes. The spleen was soft, diffuent and very large, weighing 460 grammes; the liver, also very large (weighing 2,400 grammes), was soft and yellowish brown. The renal capsules were stripped with difficulty; the cortex was swollen, well demarcated from the medulla, and had a finely granular surface. The uterine cavity was covered with layers of pus, fibrin and necrotic material.

This case presents certain uncommon features. Firstly, jaundice was deeper than we have seen hitherto in an infection due to organisms other than *Bacillus welchii*. It lacked the underlying pallor and was less cyanotic than that of typical *Bacillus welchii* jaundice; but it was so pronounced that therapy against *Bacillus welchii* was instituted and continued until the possibility of such an infection was disproved bacteriologically.

Secondly, there was present a persistent bacteriæmia due to a strain not possessed of strongly invasive properties, as judged by colony form and the failure to



demonstrate capsules on any of the four strains recovered from the patient; and death occurred in two weeks.

Thirdly, the cause of death, as revealed at autopsy, was infective endocarditis. This lesion is very rarely caused by *Streptococcus hemolyticus* Group A. The presence of the cardiac focus explains the persistent invasion of the blood stream and the fatal outcome of the infection.

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#### POOLED ADULT SERUM IN THE PROPHYLAXIS OF MEASLES.

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THE extraordinary fact that measles was entirely absent from the metropolitan area of Melbourne was announced in 1937 by Dr. F. V. Scholes, Medical Superintendent of the Queen's Memorial Infectious Diseases Hospital. When it reappeared at the beginning of 1939, it is probable that there had been no measles in Victoria and very little in the whole of Australia for nearly three years. In Victoria there were no deaths from measles in 1936, there was one death in 1937 (possibly a mistake in diagnosis or certification), and there

were no deaths in 1938. There is no similar record of such a prolonged absence of the disease in the past twenty years. The figures for the Commonwealth also showed very few deaths from measles for the whole of Australia in the three-year period, and here again the question of certification may arise. The deaths in the Commonwealth records fell from 129 in 1935 to 43 in 1936, 18 in 1937, and 10 in 1938.

Convalescent serum had been collected and used in 1931 by the Health Department of the Melbourne City Council; and serum obtained from adolescents who had suffered from measles in childhood was used in 1934. The good results obtained here, and also reports from abroad, led to the decision that pooled adult serum, which was available in considerable quantities, should be used in the city of Melbourne as soon as the necessity arose.<sup>1</sup>

When the first cases were brought to notice in February, 1939, the majority were relatively severe, although it was fine, hot weather. At one large institution for children, the medical superintendent reported that the first patients, girls aged from three to thirteen years, were nearly all very ill, with severe conjunctivitis; almost all had gastroenteritis, and many had severe bronchitis (among these were several who had "patches" of bronchopneumonia). This was noticed also among the general population, and for the first two months most of the children we saw had severe symptoms and a long prodromal period, often as long as a week, when the child was definitely ill.

As the heaviest incidence of complications and deaths is found in the second and third years of life, it was decided to offer serum prophylaxis to the younger members of infected families. It was essential that notification should be prompt, so that serum could be given to younger children as early as possible in the incubation period; and medical practitioners, schools and kindergartens were requested to notify us immediately cases came to their notice. The Press also was asked to make announcements, and this cooperation proved of considerable value.

As visits were paid to affected families whenever possible and particulars were noted, there was a large amount of data to consider. Of over 1,800 reported cases there were fairly complete details of about 1,500, so that as controls there was a considerable number of children of similar ages and condition in families in which serum prophylaxis was either refused (a very small number actually) or sought too late in the incubation period.

The tables prepared refer only to serum prophylaxis given to younger children of affected families in their own homes. In residential institutions for children and in kindergartens, although the results were uniformly satisfactory, the probability of effective exposure was more difficult to establish. There were over 100 of these institutional cases; but they have been considered only to illustrate

<sup>1</sup> A preliminary note on this subject appeared in *THE MEDICAL JOURNAL OF AUSTRALIA* on May 6, 1939.

some special point, and have not been included in the analysis.

In general the procedure was that an affected family was visited as soon as the report came to hand. Many parents, because of Press publicity, telephoned the Health Department on the first day of the appearance of the rash in the first child affected, so that it was possible in a large number of instances to give the serum to the younger children within a day or two of the appearance of the rash in the infecting case.

The material was pooled adult serum, the first batches of which dated back about three years, and were used for the first 104 cases. When these were exhausted, batches collected at later dates, six to nine months before, were used; but it was not possible to detect any marked or constant difference in the effects produced. On the whole the serum that had been stored for nearly three years seemed quite as effective as that of recent date.

The dose used was, on an average, 15 cubic centimetres. Children between the ages of nine and eighteen months were given 10 to 12 cubic centimetres, and as the aim was attenuation rather than prevention in most cases, these doses proved satisfactory. If complete prevention was desired for younger children the dose was increased to 15 cubic centimetres for an infant aged twelve months; and some older children, who were delicate, received 18 to 20 cubic centimetres. Infants aged under nine months who were completely breast-fed and healthy were not protected, and the few cases that occurred at this age were all in artificially fed children.

The large majority of children received the treatment before the fourth day after the appearance of the rash in the infecting case, and there had usually been a prodromal period of from three to seven days during which infection might have taken place.

The site of the injection was the abdominal wall on the left side, the right being avoided in case a painful reaction might be confused with appendicitis. The injection was subcutaneous, and in a few instances some swelling and pain occurred which yielded rapidly to hot fomentations.

It is not possible to give an accurate account of the incidence and behaviour of diseases which are not legally notifiable. It is thought that at most only 60% to 70% of the total cases in the city were reported. The population was estimated at 92,000, of whom approximately 17,600 were children under fifteen years of age.

The cooperation of the public was remarkably good. Parents were particularly anxious to have the treatment as soon as the first results were found to be so satisfactory, and the story had passed by word of mouth among the interested section. The fact that actually one-third of all patients aged under five years received serum was gratifying, as so many were reported too late to receive treatment.

The number of refusals among children who might have benefited was very low; only a very

small percentage of mothers, or more usually fathers, were opposed to this form of prophylaxis, which is rather remarkable considering how suspicious many of them are of "the needle".

All families in which there were younger exposed children were revisited, whether they had received serum or not, at intervals of ten, fourteen, and if necessary twenty-one days, to ascertain the results of the infection.

#### Analysis of Cases.

Records are available of 258 children, exposed in their own homes to infection by an older member of the family, who received treatment. The majority were aged between one and four years. As is shown in Table I, 67 escaped altogether, 152 had attacks so mild as to be hardly recognizable as measles, at all, 37 had mild to moderate attacks, and three had severe attacks, one with a small "patch" of bronchopneumonia. The "moderate" attacks were, in all except seven instances, much less severe than other cases in the family, but more pronounced than the characteristically "attenuated" attacks.

TABLE I.  
*Children who Received Serum.*

Age.	Number of Children.	Escaped Infection.	Suffered from Measles.	Severe Illness.
Under 6 months	9	3	6	—
6 to 12 months ..	26	9	17	1
1 year .. ..	78	25	53	2
2 years .. ..	53	11	42	—
3 years .. ..	42	9	33	—
4 years .. ..	33	4	29	—
5 years .. ..	17	6	11	—
Totals .. ..	258	67	191	3

The "attenuated" attack was amazingly mild. The prodromal symptoms, often very severe in untreated children, were usually entirely absent. Often the child was running about when visited, and it was not until the mother's attention was drawn to the slight rash that she was aware that anything was wrong. No attacks comparable with these were seen among the untreated children. There were some mild attacks among them; but in every instance the child was obviously ill, at any rate for a few days. Probably at least half of the untreated patients had a thick rash, and either bronchitis or enteritis or both.

#### *Comparison of Serum-Treated Children with other Members of the Same Families.*

As complications of measles are usually more common in younger children, it was interesting to compare the serum-treated children with the other patients in their own families, who would, of course, be a year or two older. Among 248 older children in these families there were many severe cases of bronchitis; and fourteen children required hospital treatment, twelve for bronchopneumonia, one for severe laryngitis and one for severe gastroenteritis,

*Controls.*

The controls were those children under six years of age who had been exposed to measles in an older member of the family, and received no serum, either because notification was received too late, or because the parents were unwilling. Details are given in Table II.

TABLE II.  
*Children who Received No Serum.*

Age.	Number of Children.	Escaped Infection.	Suffered from Measles.	Severe Illness.
Under 6 months	13	9 <sup>1</sup>	4	2
6 to 12 months ..	23	5	18	2
1 year .. ..	61	2	59	8
2 years .. ..	28	1	27	5
3 years .. ..	65	5	60	10
4 years .. ..	39	1	38	4
Totals .. ..	229	23	206	31

<sup>1</sup> All were breast-fed infants.

There were 229 of these children, and among them were 31 patients with severe complications, the majority requiring treatment in hospital. There were two deaths, one of a patient aged one year and the other of a patient aged two years.

Patients were noted as having "severe complications" only if they were sent to hospital with bronchopneumonia or severe enteritis, or in a few instances when a private medical attendant reported the incidence of measles and bronchopneumonia. Many others were very ill, at least twenty more requiring medical attention; but these have not been included among the "severe" cases.

It will be seen by a comparison of the above tables that the children who received prophylactic treatment with serum fared very much better than those who did not receive serum. Of the 23 who did not receive serum and who escaped infection, nine were breast-fed infants and would not have received serum in any case.

*The Incidence of Measles and Complications at Different Ages.*

The incidence of measles at the different ages, and the number of complications among the

"treated" and "untreated" groups, are shown in Table III. (The figures can be taken as a "sample" only of the untreated group, as we were able to record no more than a proportion of the total number of cases that occurred.)

This table illustrates the fact that complications were practically negligible after the sixth year, though there was one death, that of a girl, aged eleven years, from complicating pneumococcal meningitis.

The fact that complications reached their maximum in the second year of life confirms the well-known characteristic of this disease, that it takes its toll chiefly in the second year, and that thereafter the damage decreases. The three complications in the serum-treated children were much milder than in the untreated, and were obviously negligible compared to those in the rest of the population.

It is possible that other cases of pneumonia occurred among untreated children soon after their attack of measles; but it was not possible to collect complete data. The figures quoted probably represent a minimum, and the fact that in the second year 16.9% and in the third year 13.8% of untreated children had sufficiently severe complications to be sent to hospital, suffering from pneumonia in nearly every instance, and that two deaths occurred, while there was only one mild case of pneumonia among treated children, is a significant illustration of the usefulness of prophylactic treatment with pooled adult serum.

An interesting sidelight on the late effects of an epidemic of measles is the announcement, early in November, that the children's wards in all the metropolitan hospitals were admitting an unusually large number of severe cases of pneumonia. So great was the demand for space that the wards were overcrowded, and the less severe cases could not be admitted.

It has been observed all over the world, and figures obtained from the statistician here have confirmed the fact, that in years when measles is prevalent there is a pronounced rise in the death rate from bronchopneumonia, not only as a complication at the time of illness, but later in the year.

TABLE III.

Ages.	Number of Patients.	Treated Patients.	Complications.	Untreated Patients.	Complications.	Percentage of Complications in Untreated Patients.
Under 12 months .. ..	58	23	—	35	4	11.4
1 year .. ..	124	53	1	71	12	16.9
2 years .. ..	129	42	2	87	12	13.8
3 years .. ..	187	33	—	154	16	10.4
4 years .. ..	180	29	—	160	16	10.0
5 years .. ..	199	11	—	188	11	5.8
6 years .. ..	192	—	—	192	5	2.6
7 years .. ..	165	—	—	165	2	—
8 years .. ..	91	—	—	91	—	—
9 years .. ..	75	—	—	75	—	—
10 years .. ..	28	—	—	28	1	—
11 to 15 years .. ..	43	—	—	43	4	—
Adult .. ..	16	—	—	16	—	—
Totals .. ..	1,496	191	3	1,305	87	—



owing to the diminished resistance after a severe attack. This is another indication that the attenuation is of value, as the sickness is so mild as to leave no deterioration of general health or resistance.

The accompanying chart (Figure I) is compiled from data in Table III, and illustrates: (i) the age incidence of measles, showing a later incidence than usual owing to the long absence of the disease from the city; (ii) a graph showing the percentage of severe complications at different ages among untreated children.

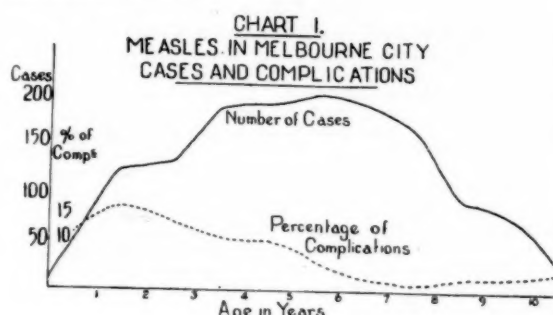


FIGURE I.

*The Incidence of Measles Among the Population at Ages at Risk.*

Although the number of cases recorded shows a fairly straight line for ages three, four, five and six years (Figure I), when the percentage among the actual number of children living at each age is calculated, the maximum incidence is seen to occur at four years of age (Table IV and Figure II).

*The Period Between the Appearance of the Rash in Infecting and Secondary Cases.*

Of 191 treated children who developed measles, 144 showed the rash by the fourteenth day after the appearance of the rash in the presumed infecting case, and 47 later than this. As it was difficult to isolate children, it is impossible to say when the effective exposure took place. It is possible, and indeed appears likely, that the incubation period was prolonged in certain cases when serum was given, and, on the whole, the disease seemed if anything milder in those cases in which this happened.

TABLE IV.

Age in Years.	Population at Risk.	Number of Cases.	Percentage of Cases.
0 to 1 .. ..	1,070	58	5.4
1 .. ..	1,050	124	11.8
2 .. ..	1,050	129	12.3
3 .. ..	1,100	187	17.0
4 .. ..	950	189	19.9
5 .. ..	1,100	199	18.1
6 .. ..	1,250	192	15.4
7 .. ..	1,250	165	13.2
8 .. ..	1,250	91	7.3
9 .. ..	1,250	75	6.0
10 .. ..	1,220	28	2.3
10 to 15 .. ..	5,060	43	0.8

Among the 144 children who developed the rash before the fifteenth day after its development in the infecting case, there were 34 moderate and two severe attacks, while among the 47 who developed the rash during the next week there were three moderate cases and one severe case.

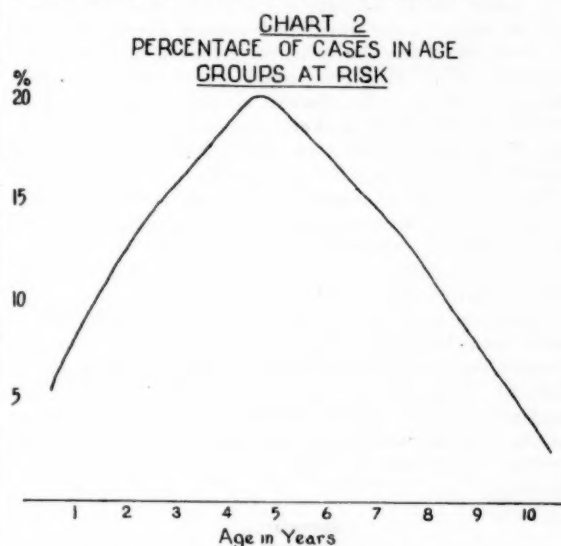


FIGURE II.

*The Number of Days Elapsing Between the Appearance of Rash in the Infecting Case and the Giving of Serum.*

The percentage of those who escaped the disease entirely does not seem to have been materially influenced by the actual date after exposure on which the serum was given. The age of the child and the size of the dose were probably more impor-

TABLE V.

Number of Days.	Number of Children who Escaped.	Mild Infection.	Moderate Infection.	Severe Infection.	Total	Percentage Escaped.	Percentage Moderate or Severe.
0 .. ..	10	30	2	—	42	24	4.7
1 .. ..	25	46	12	1	84	30	15.4
2 .. ..	11	35	8	1	55	20	15.4
3 .. ..	10	18	4	1	33	30	15.1
4 .. ..	7	10	8	—	25	28	32.0
5 .. ..	1	7	—	—	8	—	—
6 .. ..	2	1	—	—	3	—	—
7 and over	1	4	3	—	8	—	—
Totals ..	67	151	37	3	258	—	—

tant factors. The percentage of those who escaped was between 20 and 30 in the first four days. However, the severity of the disease does seem to have some connexion with this factor. Of those who received the serum on the same day as the appearance of the rash in the infecting case, only 4.7% had a moderate or severe illness, of those who received the serum on the second day the percentage was 15, and on the fourth day it had risen to 32. The numbers beyond the fourth day are too small to be significant. Details are given in Table V.

#### *Measles in an Institution.*

In one small isolated section of an institution for children, where the inmates might be considered to resemble a large family, the results of serum treatment were very suggestive.

There were 49 children, aged between three and seven years. When the first cases occurred serum was given to 17 children aged under four years, and no severe case developed among them; in fact, in every instance the mild or attenuated form was noticed. Five children, aged five and six years, did not contract the disease, and may have had it earlier in life, though there was no record. Among the 27 untreated children there were six cases of bronchopneumonia with one death.

The same observations were made in the general wards of this institution. Children who received serum had attenuated attacks, while two deaths and many cases of bronchopneumonia occurred among those who were not treated.

When the fact of exposure to infection is definite, there can be little doubt that immediate serum therapy for younger children would prevent a great deal of damage. It is particularly valuable in institutions, to which children come from poor homes and are suffering from malnutrition, as their general resistance is low and they usually suffer severely.

#### *Summary.*

When measles broke out in the city of Melbourne after three years' absence, serum prophylaxis was offered to all young exposed children.

2. The material used was the pooled adult serum issued by the Commonwealth Serum Laboratories. The usual dose was 15 cubic centimetres, but it varied from 10 to 20 cubic centimetres according to the age and condition of the patient.

3. Two hundred and fifty-eight children were treated in their own homes, and about 100 in institutions.

4. The results achieved were very satisfactory. Of 258 children treated, 67 escaped the disease, 151 had it in the attenuated form with no prodromal sickness and no complications of any kind, 37 had moderate attacks and only three had severe attacks, one with slight bronchopneumonia.

5. Over 10% of the patients among untreated children under six years of age in the rest of the population had severe complications, mostly bronchopneumonia requiring hospital treatment, and two died.

## **Reports of Cases.**

### **CASE OF FOREIGN BODY IN THE AIR PASSAGES WITH AN UNUSUAL RESULT.**

By JOHN BROADBENT, M.B., B.S.,  
Crookwell, New South Wales.

This case seems worth recording on account of its unusual nature.

#### *Clinical Record.*

R.K., aged one year, was first seen on November 16, 1939. The child had been "off colour" since the previous day. The parents had noticed that he had a cough and that he was disinclined to take food. The general condition of the child was good, and he was not distressed. On examination he was found to have a temperature of 37.8° C. (100° F.), and râles were present on both sides of the chest. A diagnosis of acute bronchitis was made.

The patient returned home to the country and was not seen again until nine days later, on November 25. The parents stated that the infant had become apparently well in about three days after the previous visit, and had been allowed to run about; but now he appeared to have had a relapse. He had been very irritable and had had a bad cough for two days.

On examination it was at once obvious that the child was extremely ill. A temperature of 38.4° C. (101° F.), the presence of coughing and grunting respiration, the child's pale and cyanosed face, all pointed to a diagnosis of pneumonia. Auscultation confirmed the diagnosis. In hospital his progress appeared normal for two days. His condition was reasonably satisfactory, and he was not unduly distressed. Then occurred a sudden, very severe fit of coughing. A slight hæmoptysis, with the loss of about one fluid drachm of blood, followed. The child at once became very cyanosed and extremely distressed. The following day another, larger, hæmoptysis occurred, about one ounce of blood being lost; and this was accompanied by a large blood clot about two and a half inches in diameter.



FIGURE I.  
Mass of blood clot coughed up by the child.

For the next four days the child's condition was very bad; cyanosis, frequent coughing and a foul breath were present, but there was no further hæmoptysis. He seemed to be in severe pain. The temperature now began to swing between 40° C. (104° F.) and normal.

At this stage the parents remembered that the child had been seen chewing a piece of barley grass the day before he first became ill on November 16.

On November 30 a swelling became evident beneath the left scapula and extending under the left arm. It was tender and slightly red. An area just below the angle of the left scapula seemed to be definitely pointing, and in

the middle of the area a grass seed was seen under the skin. Gently this was removed with forceps, and fourteen more similar barley grass seeds were withdrawn, followed by some thin, white, foul-smelling pus. The sinus was dilated with sinus forceps and the wound left to drain.

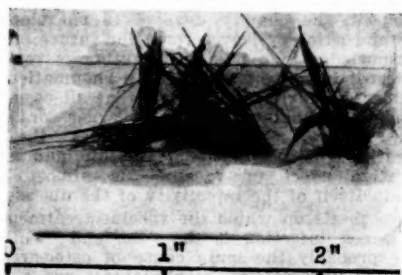


FIGURE II.  
Barley grass seeds removed from the chest wall.

After this the child made steady and rapid improvement, and at the end of a week all drainage had ceased and the sinus was well healed. The child was discharged from hospital soon afterwards and has remained perfectly well since.

#### AMYLOIDOSIS COMPLICATING RHEUMATOID ARTHRITIS.

By G. M. OXER,

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IMRIE AND AIKENHEAD<sup>(1)</sup> reported a case of amyloidosis complicating Still's disease, because of the rarity of the occurrence of amyloid disease in the absence of suppuration, syphilis or tuberculosis. The following two cases, being of a similar nature, may therefore be of interest in this connexion.

##### Case I.

W.Q. was a male patient, aged twenty-seven years. When aged about fourteen years he had pains in the right ankle and left arm. The next joint affected was the right knee. He had already been in hospital twice before he was admitted to the Austin Hospital at the age of twenty-one years. Pain was then most severe in the hips, which were fixed in flexion. There was gross limitation of movement in all of the other large joints, with almost complete fixation of the knees. The neck and jaw were also involved, but the fingers were unaffected. The patient's general health was good and he was able to walk on crutches. An X ray examination revealed absorption of joint cartilages and decalcification of adjacent bones in all joints examined, the changes being most advanced in the hip joints. The Wassermann test elicited no reaction.

Soon after his admission to the Austin Hospital, operation ("boring capsules") was performed on the hips, and weight extension was applied. Two months later there was no pain, and flexion had decreased. A search for septic foci proved fruitless.

Thereafter massage treatment was employed, and four years later the patient, although much more crippled, was still walking a little with assistance. The following year skiagrams revealed solid bony ankylosis in the left hip with early bony ankylosis proceeding on the right side. The same year the results of a blood examination were recorded. Abnormal features were the number of red corpuscles (2,980,000 per cubic millimetre) and the

haemoglobin value (6.5 grammes per 100 cubic centimetres). Iron and "Anahemin" were administered. Five months later the red corpuscles had increased by half a million per cubic millimetre, but the haemoglobin value had decreased to 5.7 grammes per 100 cubic centimetres. Four months later again the haemoglobin value had dropped to 4.4 grammes per 100 cubic centimetres, and shortly afterwards the patient died. The important necropsy findings were a little left ventricular hypertrophy, terminal oedema of the lungs, gross amyloid change in the liver and amyloid change in the kidneys and the spleen.

A feature of this man's illness was an iridocyclitis; the diagnosis was confirmed by the ophthalmologist. The first symptom was falling vision, which appeared at the age of 22 years, and blindness was almost complete by the following year.

##### Case II.

F.K. was a male patient, aged twenty-one years. This patient had "growing pains" before the age of nine years. At this age he experienced transient pain and stiffness in the left hip. Transient pain and swelling of several other joints occurred during the next two years, when there also occurred some diarrhoea and loss of weight. He was treated as an in-patient at the Children's Hospital for the following two years.

At the age of fourteen years he was transferred to the Austin Hospital. For diagnostic purposes the left elbow was examined radiologically; gross loss of cartilage, rarefaction of adjacent bones and early fusion of the epiphyses were disclosed. There was no ankylosis. The Wassermann test elicited no reaction. The results of the blood examination were within normal limits, except for the presence of some anisocytosis and an occasional macrocyte.

The year after his admission to hospital pain was noticed in the left eye, and the patient was placed in the care of an ophthalmologist, who diagnosed iritis. In spite of treatment, however, the patient was blind in both eyes by the time he was nineteen years of age.

Dyspepsia was complained of four years after his admission to hospital and there was slight hæmatemesis; but a radiographic examination by means of a barium meal revealed no lesion of the digestive tract. About this time the patient was receiving iron treatment, although the clinical notes omit reference to the onset of anæmia. Shortly before his death the anæmia was very gross; the red corpuscles numbered 2,410,000 per cubic millimetre and the haemoglobin value was 5.1 grammes per 100 cubic centimetres. The level of liver dulness was raised on the right side of the chest anteriorly, and there were two fingers' breadth of liver extension below the right costal margin. Amyloid disease was diagnosed. Occasional pus cells were seen in the urine, and the Wassermann test, again made for confirmation, was without result. Nearly all joints in the patient's body were fixed, and gross distortion was present.

*Post mortem* examination revealed oedema of the lungs, moderate amyloid change in the liver, and more pronounced change in the spleen. The kidneys were large, dense and somewhat irregular, streaky on section, and apparently amyloid. This observation was confirmed microscopically, as in Case I. The sternum, some ribs, the lower end of the left femur and the upper end of the left tibia were examined for marrow. In the last was a somewhat gelatinous red marrow, and in the remainder a reddish trabeculated medulla, but no marrow cavity or fluid marrow.

##### Discussion.

It is interesting to be able to supplement Imrie and Aikenhead's report; but from my observation of amyloid disease the finding is hardly unexpected, if one regards rheumatoid arthritis as a chronic infective condition. Suppuration is not necessary; for although the condition is not uncommon in surgical tuberculosis, it is far from uncommon in uncomplicated pulmonary tuberculosis. In one subject of pulmonary tuberculosis examined by me at autopsy, although there was no history or pathological



evidence of any other condition, the change was very gross. The patient was aged twenty-one years and the symptoms dated from, approximately, only twelve to fifteen months before death. The disease is also known to occur in association with non-inflammatory conditions, for example, malignant disease, and within recent months I have seen one example associated with this condition.

The cases recorded above are of interest for two other reasons: (i) the early age at which these patients died (in our experience at the Austin Hospital sufferers from this condition are usually long-lived), (ii) the ocular condition from which both suffered. This ocular disorder, however, was probably unassociated with the amyloidosis, for two other patients at present in the hospital (females, aged fifty-seven and twenty-one years respectively), who both have advanced rheumatoid arthritis, but no evidence of amyloid disease, are also blind for the same reason.

#### Acknowledgement.

I am indebted to Dr. C. H. Hembrow for permission to publish details of these cases, and to Dr. A. M. Hutson for helpful criticism.

#### Reference.

- <sup>1</sup>A. H. Imrie and A. C. Aikenhead: "Amyloidosis Complicating Still's Disease", *The Lancet*, Volume II, August 19, 1939.

### Reviews.

#### THE WORK OF THE CHARTERHOUSE RHEUMATISM CLINIC.

DR. H. WARREN CROWE has written a book entitled "Rheumatism",<sup>1</sup> which is largely devoted to an account of the work of the Charterhouse Rheumatism Clinic. This clinic was opened in November, 1928. It was extended in 1932 and is to be extended again shortly. It was established for the free treatment of poor persons, suffering from chronic rheumatism, by means of inoculations of stock vaccines. It is asserted that 85% of 6,000 persons have derived benefit from that type of treatment alone. Occasionally various forms of physical therapy are adopted as auxiliary treatment. Rheumatic fever, gonorrhoeal arthritis, gout *per se*, Charcot's arthropathy, von Recklinghausen's disease and Paget's disease are specifically mentioned by Dr. Crowe as conditions that do not fall within the scope of the book.

Dr. Crowe and his colleagues are "convinced that in every case of rheumatism and arthritis there is an infective factor", and they consider that vaccine therapy has been very successful. They recommend it as the first line of treatment to be carried out by general practitioners who they believe will then seldom find it necessary to obtain the assistance of a specialist.

The book contains a description of Dr. Crowe's experiences at the Charterhouse Rheumatism Clinic and in private practice. The treatment, which has become more or less standardized, is discussed, and the technical details of the preparation and uses of the vaccine are adequately described.

While we are not in a position to criticize the records of results claimed, we are inclined to deprecate the widening of the definition of rheumatism to include all conditions that result from local inflammatory reactions of the skeletal tissues to any foreign substance. The person who reads the introductory chapter attentively will probably be on his guard against accepting what follows without mental challenge.

<sup>1</sup>"Rheumatism", by H. W. Crowe, D.M., B.Ch., M.R.C.S., L.R.C.P.; 1939. London: John Bale Medical Publications Limited. Demy 8vo, pp. 294, with illustrations.

The main divisions within the rheumatic group are non-articular rheumatism, osteoarthritis, rheumatoid arthritis and active infective arthritis. The subdivisions and differential diagnosis from each other form the subject matter of an interesting and informative chapter, which is well illustrated with skiagrams and charts. As one would expect, the chapter devoted to pathology, morbid anatomy and aetiology leaves room for future emendations as our knowledge increases. The author is very insistent that the most important factor in all rheumatic conditions is infection; he advances the view that all cases "without any exception whatever have a larger or a smaller infective factor". He even includes the so-called "degenerative" osteoarthritis of the hip and states that the curative effect of vaccine "is almost conclusive evidence in itself of the infectivity of the disease".

The hypothesis on which the vaccine treatment is based is that mixed infection is the rule, and "while streptococci are probably the main cause of osteo-arthritis and non-articular rheumatism, staphylococci are predominant in rheumatoid arthritis and possibly also in neuritis". Dr. Crowe first propounded that conception in 1912. He amplified it in 1926, and finds no reason to modify it today. He has done a great amount of experimental work, including the isolation of osteo-trophic streptococci. He emphasizes with reason that the right vaccine must be used in the right way to get satisfactory results. The main value of the book is the description of how that laudable objective can be achieved. It is enriched by sections contributed by Dr. Crowe's colleagues. The chapter on manipulation is by Dr. Guy Beauchamp; that on X ray therapy by Dr. Gilbert Scott. There is also a chapter on orthopedics by Dr. A. T. Fripp.

In the concluding section the author discusses rheumatism as a national problem, making out a good case for the establishment of a series of rheumatism homes in which the treatment of the large number of sufferers from arthritis and non-articular rheumatism in Great Britain could be undertaken at a diminishing cost, which would be less than a million pounds a year.

#### PHYSICAL THERAPY.

DR. HUGH MORRIS in his "Physiotherapy in Medical Practice" has written a quite useful book for the medical practitioner who wishes to know what results to expect from electrotherapy, and to learn all the technique of the simpler methods of its application.<sup>1</sup> But his title claims too much, as he covers only electrotherapy and heliotherapy. He deals briefly but adequately with the physics of electricity, and proceeds to consider the constant current and its uses. There is a good chapter on the electrical diagnosis of muscle and nerve lesions, and the limitations of their treatment by electricity. The chapters on diathermy, including the short-wave currents, are in the main good, but his description of hyperpyrexia is very scrappy, and makes the procedure appear all too simple. Also he falls into the too common mistake among English writers of stating that the "Inductotherm" heats only superficial tissue. It is conductivity, not depth, that determines heating in this method. There is a chapter on the high-frequency current in surgery, dealing with the desiccating, coagulating and cutting currents. The sections dealing with ultra-violet radiation, heliotherapy and infra-red radiation are all adequate. The author gives a useful appendix on precautions to be taken against shock from electro-medical apparatus. There is a very good glossary, defining shortly all the technical terms used in the book. The index is satisfactory. The printing, diagrams and illustrations are all good. Unfortunately there are several bad misprints, which, it is to be hoped, will be corrected in any future editions.

<sup>1</sup>"Physiotherapy in Medical Practice", by H. Morris, M.D., D.M.R.E.; 1939. London: Edward Arnold and Company. Demy 8vo, pp. 283, with illustrations. Price: 12s. 6d. net.

## The Medical Journal of Australia

SATURDAY, FEBRUARY 17, 1940.

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### ALLERGY AND IMMUNITY.

MEDICAL nomenclature can show few words more frequently misapplied than the term allergy. All-pervading in the literature of recent years, the subject of allergy and conceptions of the relation of this condition to immunity and anaphylaxis respectively have become clouded with much confused thought and loose writing. The prevailing tendency to bring an increasing number of diseases within the sphere of allergy amounts almost to a cult, in following which

Some to the fascination of a name  
Surrender judgment hoodwinked.

It may be assumed that the term immunity needs no definition; it is more than doubtful, however, that so much may be taken for granted respecting anaphylaxis and allergy. Each of these names is designed to cover differing manifestations of hypersensitiveness. The term anaphylaxis, which by derivation means "without protection", should be reserved for that state of instability induced by the access of foreign protein, serum or cells to the tissues and manifested by the spasmodic contraction of smooth muscle, notably that of the bronchi and of certain blood vessels. Allergy, a name devised by von Pirquet to connote an altered and exaggerated

reactivity, in its proper usage should be restricted to the state of specific hypersensitiveness which develops as the result of the entry to the tissues of foreign substances, usually but not necessarily protein, and is exhibited by local occurrence of tissue damage and inflammation wherever the alien sensitizing substance lodges in the previously sensitized tissues. Thus a musculo-spasmodic type of reaction is identified with anaphylaxis and an inflammatory or necrotizing process with allergy.

In a consideration of allergy in relation to immunity from infection, discussion is necessarily confined to the specific hypersensitiveness to bacterial protein or its disintegration products which supervenes as a result of infection. Certain well defined allergic phenomena arise independently of infection, as witness the reactions of sensitized persons to pollens, food proteins, dust and the like; but with these for the present we have nothing to do. Our purpose is to consider bacterial allergy—typical examples of which are the tuberculin reaction of clinical application and its prototype the Koch phenomenon in the tuberculous guinea-pig—in relation to the state of immunity from infection.

Allergy and immunity are by no means interchangeable terms, although in the clinical vocabulary they are often made to serve as equivalents. Whether allergy is an expression of immunity, whether it is nothing more than a possibly harmful concomitant, and whether the development of hypersensitiveness to the protein of the infecting agent is in any way essential to the establishment of effective immunity, are questions of immunological controversy.

Persons who fail to react to the cutaneous tuberculin test are by common consent regarded as more vulnerable to tuberculous infection than those who exhibit the allergic response usually termed a "positive" reaction. In the Koch phenomenon a guinea-pig rendered sensitive to tuberculo-protein by a small injection of tubercle bacilli reacts violently at the site of a second injection given several weeks later. Tissue necrosis and ulceration supervene, but the ulcer heals and the regional lymphatic glands escape the tuberculous infection. The

explanation advanced and generally accepted for the facility with which tubercle bacilli establish themselves in the hilus glands in tuberculous pulmonary infection in childhood, as opposed to their apparent failure to do so in adults, is based on strict analogy with the Koch phenomenon. Adult persons who have encountered and withstood tuberculous infection in earlier life have in the process become sensitized to the protein of the tubercle bacillus. Subsequent infection evokes an allergic response, expressed as an inflammatory reaction which not only mobilizes leucocytes, but by the deposition of a fibrin barrier and the induction of lymphatic thrombi effectively localizes the invading microorganisms. This widely accepted view regards the accelerated reactivity of the tissues, or allergy, as an important factor contributing to their acquired immunity, a factor which in its operation exacts a certain toll of tissue damage or even necrosis.

The foregoing apparently well entrenched doctrine has been seriously challenged by Arnold Rich, an iconoclast, yet no mere breaker of images, who replaces the idols he shatters by advancing soundly based and essentially logical alternative theses. In such a role Arnold Rich figured in his well known work on the pathogenesis of tuberculous meningitis.<sup>1</sup> With H. A. McCordock as collaborator, he questioned the validity of the established conception of the origin of tuberculous meningitis, undeterred by its descent through a long line of text books. The closely reasoned thesis in which Rich and McCordock showed that tuberculous meningitis was initiated by the rupture of contiguous caseous foci into the subarachnoid space, and not by hæmic dissemination of tubercle bacilli directly, displays the same penetrating analysis of firmly rooted ideas as is evident in the studies of Rich and his associates on the subject of bacterial allergy and its relation to immunity.

That sensitization to the protein of bacteria which have gained a foothold in the tissues should occur *pari passu* with the development of the immune state is not surprising; but

that such sensitization is anything more than an incidental process, a mere concomitant of immunity proper, is vigorously denied by Rich. In a notable address on the nature and role of bacterial allergy, delivered at the Third International Pædiatric Congress<sup>1</sup> (London, 1933), Professor Rich went so far as to say that there was not one single experiment or observation on record through which hypersensitiveness had been shown to be necessary for the operation of immunity in any infection under any condition whatsoever. In developing the argument which culminated in this pronouncement, Rich adduced experimental work designed to prove that immunity is separable from allergy by three different methods in a variety of infections. In the first place it was found that it is possible to establish acquired immunity without the concomitant development of allergy. In a second group of experiments Rich and his collaborators succeeded in dissociating immunity and allergy by injecting the serum of allergic immune animals into normal ones. The immunity was transferred, but not the hypersensitiveness. Finally immunity was separated from allergy by means of desensitization. In each of the three types of experiment it was found that the absence of allergic inflammation in no way impaired the operation of immunity.

In the address to which we have referred, Professor Rich contested the view that allergic inflammation is responsible for the localization of bacteria to the site at which they lodge. His studies had shown that immobilization of bacteria in the immune, non-allergic animal was just as effective as in the allergic, and he maintained that the prevention of spread of bacteria was primarily secured, not by allergic inflammation, but rather by the action of circulating antibody, particularly agglutinin. When eventually it was found possible to induce a state of allergy unaccompanied by acquired immunity, the hypersensitiveness acting alone seemed to diminish the natural resistance to infection.

The controversy which has centred upon the question of whether bacterial allergy is a part of

<sup>1</sup> Bulletin of the Johns Hopkins Hospital, Volume LII, 1933, page 5.

<sup>1</sup> The Lancet, Volume II, 1933, page 521.



the host's protective mechanism, or an unrelated concurrent development and possibly a handicap, remains unsettled. Nor should we imagine that the last word has been said in regard to the hypotheses which would attribute a major part to allergy in the pathogenesis of such diseases as rheumatic fever, pneumonia, and glomerulonephritis. Experiments which show that exudative inflammatory states in the lungs or kidneys follow the sensitization of animals and subsequent introduction of the allergen into the trachea or the renal artery, indicate that it is possible to precipitate pneumonia or nephritis in such a manner, but furnish little evidence that the naturally occurring diseases are expressions of a similar process. The now classic experiments of Blake and Cecil, which showed that the introduction of even minimal amounts of a virulent pneumococcus culture into the trachea in monkeys was consistently followed by the development of lobar pneumonia, did not include a preliminary "sensitization" of the animals by injections of allergens such as pneumococcus vaccine or autolysate. In the experimental work which has sought to demonstrate the allergic nature of glomerulonephritis, conditions far removed from any conceivable circumstances in the natural disease have been created. The theory that an individual must be sensitized before he can acquire a patently infective disease such as pneumonia is not yet sufficiently substantiated to displace the simpler conception of direct action on the part of bacteria or their toxins.

If it be permissible to paraphrase the Scriptures we may perhaps observe in conclusion that now abideth immunity, anaphylaxis, allergy, these three; but for many the greatest of these is allergy.

### Current Comment.

#### THE TOURNIQUET.

THE tourniquet is probably one of the oldest of surgical instruments, and its employment in the first-aid control of arterial hæmorrhage from the limbs is universal, while it also finds wide use in many operative procedures when a bloodless field is desired. It has long been recognized that the tourniquet must be applied with care and allowed

to remain in position for only a limited period if unfavourable effects on nervous function and on the vitality of the part are to be avoided. It has also been well appreciated that the release of a tourniquet which has been in position for a protracted period may be followed by the onset of a condition of shock, due apparently to the sudden entrance into the general circulation of metabolic products. This last feature of local asphyxia received the notice of the Shock Committee during the World War, and has recently been used by F. M. Allen<sup>1</sup> as a suitable experimental means for the study of shock. The method has the advantage of allowing quantitative control and standardization of the degree of shock, the exclusion of nervous factors, the absence of dead tissue or blood clot, and the chance for complete recovery of the animals when desired. The animals used for experiment were chiefly rats; and control of the degree of shock was achieved by a variation of the amount of tissue ligated, and by a change of the duration of ligation. With allowance for occasional variation in the resistance of the animals, a satisfactory degree of standardization was obtained. Thus with ligation of one entire hindleg for three hours, recovery is assured, but ligation maintained for five hours is regularly fatal. After four hours of ligation most animals die. It is not, however, with the subject of shock that this commentary chiefly concerns itself, but with certain subsidiary facts relating to the use of a tourniquet which Allen has found<sup>2, 3, 4</sup> to emerge from the results of his experimental work. Of these the facts of greatest practical importance are those relating to the periods during which a tourniquet may be left in position. Allen investigated these values in animals and extended the scope of his experiments to examine the resistance of tissues to asphyxia at various temperatures. The results warrant careful study, and though they have been obtained from animal experiments, there seems no reason why the principles should not hold good for human subjects. Clinical investigation seems indicated, as the present war will undoubtedly lead to the use of tourniquets on very many occasions, and often at times when nothing more can be done for many hours. Most surgeons feel vague about the period during which the circulation of a limb may safely be stopped; and further when protracted ligation cannot be avoided, most if not all surgeons would advise keeping the affected limb warm in the hope of enhancing its prospects of survival. Allen's work shows that mammalian tissues can survive stoppage of their blood supply for surprisingly long periods; for example, a dog's foreleg recovered completely after ligation for fifteen hours at room temperature, and a chicken's wing survived after nine hours. When the ligated limb was warmed or cooled during the experiment (with precautions to avoid warming or cooling the rest of the animal) the results both local and constitutional were striking. Limbs

<sup>1</sup> *Archives of Surgery*, January, 1939.

<sup>2</sup> *The American Journal of Surgery*, September, 1939.

<sup>3</sup> *Surgery, Gynecology and Obstetrics*, December, 1938.

<sup>4</sup> *Surgery, Gynecology and Obstetrics*, June, 1939.

asphyxiated for even short periods at a little above 40° C. had an appearance scarcely distinguishable from that of normal limbs dipped briefly into boiling water. This effect is confirmed clinically by the ease with which tissues of poor vitality are burned by comparatively low temperatures, as, for example, by hot water bottles. The shock which followed release of the ligature was also greatly increased in these animals. On the other hand, when the ligated tissues were cooled, asphyxia was tolerated for greatly increased periods and the constitutional effects were relatively lessened. It seems that this is almost certainly due to the slowing down of metabolism, and Allen argues that human tissue, in which metabolism is normally slower than that of the small mammals, should withstand ligation better. Deliberate cooling of patients' limbs to the temperatures found best in animal experiments—temperatures of about 2° C.—though apparently logical, is not a procedure to be adopted precipitately, nor in fact is it likely that it could be achieved completely owing to the greater thickness of the limbs. It would, however, appear that Allen is right in condemning "the utterly irrational custom of warming an asphyxiated limb" after arterial embolism or the application of a tourniquet. It seems probable that some benefit would result if limbs asphyxiated by embolism or a tourniquet were exposed and not wrapped in wool or blankets. There is no argument against keeping the rest of the patient warm, but there is strong evidence that his asphyxiated limb will survive longer if it is not warmed.

#### FETAL PERICARDITIS.

INSTANCES of fetal endocarditis are not rare, and their possible association with congenital stenosis or even atresia of the cardiac orifices has been frequently discussed. Fetal pericarditis is, however, extremely uncommon. R. W. Kelley<sup>1</sup> states that he found only one case in the literature. This was reported by Job, Lévy and Morlot in 1927. It occurred in an infant born at term, after a normal pregnancy. Respirations were initiated after great difficulty, the child remained cyanotic, and died four hours after delivery. At autopsy the pericardial sac contained a serofibrinous exudate and the epicardial surface of the heart showed small opaque plaques. Acute fibrinous endocarditis was present with verrucous vegetations on the mitral and tricuspid valves. The mother's blood did not react to the Wassermann test. No cultures or smears were made. Kelley proceeds to describe a case of fetal pericarditis, the first instance of this condition in approximately 7,000 autopsies performed at the Department of Pathology, Washington University School of Medicine. The infant in question was a still-born negro girl, of approximately twenty-two weeks' gestation. The mother had received treatment for syphilis twelve

years previously. All subsequent Wassermann and Kahn tests had failed to elicit reactions. Both parents had had gonorrhœa, recurring in spite of treatment. During her pregnancy the mother had complained of profuse vaginal discharge. Apart from this, her pregnancy and puerperium were normal. Examination of the still-born child revealed the presence of organizing purulent pericarditis. The only other findings of note were thickening of the subperitoneal connective tissue and the presence in the stomach and duodenum of an exudate composed of desquamated epithelial cells, mucus and large numbers of polymorphonuclear leucocytes. Examination of sections and smears failed to reveal bacteria. No cultures were made. The author suggests that the fetal pericarditis was almost certainly connected with the chronic gonorrhœal infection of the mother. The mode of such infection is, of course, not clear. The placenta showed no evidence of inflammation; the amniotic fluid appeared normal. The occurrence of gonococcal arthritis in the newly born has been recorded, and it has been suggested that it is due to transient phases of bacteriæmia in the mother during her pregnancy. Some such explanation may be offered as the cause of fetal pericarditis.

#### SURGICAL TREATMENT OF ACUTE CHOLECYSTITIS.

OPINION is divided on the value of early operation in the treatment of acute cholecystitis. Many still follow the older custom and treat the condition conservatively, unless forced by obvious deterioration in the patient to have recourse to surgical intervention. Operation in these unfavourable circumstances carries a high mortality, which is by some illogically regarded as a proof that surgical treatment is wrong. As with so many other problems, statistics are contradictory, and plausible reasons have been advanced to support opposing views. Thus it has been urged that perforation of the gall-bladder is uncommon owing to its (usually) thickened wall, that the inflammatory process generally subsides, and that operation, at any rate on or after the third or fourth day, is difficult and carries a heavy risk. Others, however, point out that the exact local condition is always a matter of uncertainty and that gangrene, perforation and peritonitis are by no means infrequent, while the retention within the patient of a focus of sepsis may lead to infection of the bile ducts, liver and pancreas, and to increased liver damage. Operation, if successful, removes a damaged and useless organ, is not difficult in experienced hands, and affords the patient permanent relief in the most rapid and comfortable manner. Professor Hans Finsterer<sup>2</sup> has for twenty years made it a practice to operate early during acute attacks of cholecystitis and states that his results have been good. He considers that operation, carefully performed, does not tend to spread the infection, and in 161 operations

<sup>1</sup> *Archives of Pathology*, August, 1939.

<sup>2</sup> *Surgery*, October, 1939.

performed during the acute attack has not encountered a death from peritonitis. This must be weighed against the fact that if perforation occurs during conservative treatment, it is difficult to recognize. There is no sudden pain or characteristic syndrome as with perforation of a peptic ulcer, and the patient may for a time even feel better owing to relief of the tension within the gall-bladder. A rise in the pulse rate does not occur for some time and, it is held, may sometimes be masked by a bradycardia due to cholamia resulting from biliary obstruction or resorption of bile from the peritoneal cavity. Finsterer considers that when death follows the surgical treatment of acute cholecystitis, the fatal outcome depends on several factors of which operation is usually the least important. He recommends routine pre-operative irradiation of the spleen to increase blood coagulation, one-third of an erythema dose being given immediately before operation. Blood transfusion is also regarded as advantageous. Finsterer is insistent that the use of ether should be avoided owing to its toxic effect on an already damaged liver. He prefers local anaesthesia of the abdominal wall with splanchnic or paravertebral anaesthesia. If on incision of the peritoneum a large abscess cavity is opened, this should be drained and nothing further attempted at the time. In ordinary cases the peritoneal cavity is packed off with great thoroughness, and care is taken to avoid damage to the liver by retractors or attempts to rotate the organ. Cholecystectomy is considered a better operation than cholecystostomy. While some British surgeons, such as Wakeley, have with few reservations advocated the principle of early operation in acute cholecystitis, probably the greater number have adopted a moderate attitude, assessing each case on its merits, and following much the same plan as that preferred by Rendle Short. This surgeon advises operation in the first forty-eight hours of an acute attack, especially if there is a previous history of cholecystitis. Should the attack be of longer than forty-eight hours' duration, expectant treatment is recommended, with removal of the gall-bladder four weeks later, unless intervention is necessitated by continued pain, tenderness and fever, in the presence of a palpable gall-bladder. In these circumstances Short advises cholecystostomy as a safer procedure than cholecystectomy, which, however, is to be preferred when operation is undertaken early, that is, during the first forty-eight hours.

#### THE EXPERIMENTAL TRANSMISSION OF ULCERATING GRANULOMA FROM MAN TO MAN.

ALTHOUGH it was early in the century when Donovan described the so-called Donovan bodies in association with ulcerating granuloma, it has still never been incontestably shown that they are the sole cause of the disease. Their place in the scale of living things is not certain and they have not been propagated in culture or in animals. Although

many investigators have asserted that they have grown organisms comparable with the Donovan body in culture from material obtained from the lesions of ulcerating granuloma, these organisms have not been identical and have not produced ulcerating granuloma when injected into monkeys or human beings. Some interest therefore attaches to a report by R. B. Greenblatt and collaborators<sup>1</sup> that they have taken pus aspirated from unruptured inguinal abscesses in which the sole microbe discovered was the Donovan body, injected it subcutaneously into human beings (negro volunteers and negresses suffering from tuberculosis and schizophrenia), in whom were produced the typical lesions of ulcerating granuloma from which Donovan bodies were recovered.

It is true that the disease has previously been transferred from one individual to another by the transplantation of tissue, but these experiments were open to the criticism that the tissue was derived from open lesions and organisms symbiotic with the causal agent would almost certainly have been present and thrown some doubt on the identity of the latter. The present experiments, to which this criticism is not applicable, also throw some new light on the natural history of the disease. Traditional teaching has emphasized that ulcerating granuloma is a disease of the skin and corium and not of the lymphatics: the indurated swelling in the groin which ruptures and produces the typical granulations is not a bubo but a "pseudobubo". However, the authors have demonstrated Donovan bodies in the underlying lymph glands in two cases of ulcerating granuloma, thus demonstrating that the microbes can and do travel in the lymphatics, though their mode of reaching the skin and subcutaneous tissues of the groin from a primary lesion in the genitalia is not clear. In some of these glands an "endothelial reaction" was present and Donovan bodies were seen occupying large endothelial cells and apparently multiplying there by a process of schizogony. The facts that the organism appears to be strictly a tissue parasite of man, that it reproduces by multiple segmentation in living tissue and only in large mononuclear cells, that antimony and potassium tartrate have therapeutic action upon infections and that infections recur after apparent healing lead the authors to suggest that the Donovan body is a member of the phylum of the Protozoa.

Ulcerating granuloma is a disease which does not fall within the experience of most practitioners in this country, although it does occur in the far north of Australia and in Oceania. The work of Goldblatt and his collaborators, however, is of interest to all if only because of the use which they have made of negroes, inmates of institutions and others, as subjects for the purposes of experimental medicine. It is a method which is obviously susceptible of wide exploitation, but the propriety of such exploitation might well be the subject of controversy.

<sup>1</sup>The Journal of the American Medical Association, September 16, 1939.



## Abstracts from Current Medical Literature.

### PÆDIATRICS.

#### Management of Children with Subacute Rheumatic Fever.

VALENTINA P. WASSON (*Archives of Pediatrics*, September, 1939) draws attention to the fact that not only among the laity, but to a great extent even in the medical world, there is still a serious misconception about the problem presented by rheumatic fever in its less acute manifestations. Too often the bearing of these manifestations on the heart is overlooked. The correct evaluation of cardiac signs and symptoms and the question of handling of the potential cardiac and cardiac patients in the community are not receiving proper attention. Neglect by parents and doctors of a host of subacute symptoms has led in the end to serious crippling of many children. On the other hand, incorrect diagnosis of heart disease has led to almost as much crippling of the child's and the parent's mind. Rheumatic fever in the subacute stages is difficult to diagnose and it may require weeks or months of patient surveillance by doctor and parents before the physician can be prepared to brand a child as a potential cardiac. A careful history in which great importance should be attached to hereditary, hygienic and emotional factors is the first essential, followed by a physical examination. A blood count should be made and the erythrocyte sedimentation rate determined. After these initial steps the diagnosis is often far from conclusive, and to achieve this end it may be necessary for the physician to see the child every month or often more frequently. At each visit the interval history, the weight and general appearance of the child, corroborated by blood counts and erythrocyte sedimentation rates, are excellent indices of rheumatic activity and the patient's general well-being. Once the diagnosis is made it is incumbent upon the physician to explain to the mother the significance of rheumatic fever, to caution her about its connexion with heart disease, but to warn her against undue anxiety and oversolicitude for the child. It is also important to explain to the child and parents that the doctor alone cannot do the child any good and that best results are obtained through cooperation by parents, child and doctor. The social service department is an invaluable adjunct. The most important single factor in the régime of a rheumatic child is mental and physical rest, which unfortunately in many cases is the hardest thing to obtain because of economic uncertainty, over-crowding and lack

of parental discipline. The question of physical exercise is of paramount importance. No hard and fast rules can be laid down, but one thing can be stated dogmatically: the amount of exercise that a child is entitled to does not depend on whether he has one, two or three murmurs, but on the state of the myocardium and on whether an infection that may have a possible relation to a recrudescence of rheumatic fever is present. The cardiac muscle is kept in good condition by adequate nutrition of the body, freedom from infections and emotional strain and exercise commensurate with its reserve power. All children with a cardiac lesion should be barred from competitive sports. A child recovering from an attack of rheumatic fever should be barred from all exercise until the absence of an active process is established. He should not be allowed out of bed until the temperature, leucocyte count and erythrocyte sedimentation rate are within normal limits, and then gradual training of the heart muscle should be begun. The object of a rheumatic heart clinic should be the rehabilitation of the patient with an impaired heart and the protection of the heart against further infections.

#### Sulphapyridine and Pneumonia.

JEROME S. LEOPOLD AND IRWIN PHILIP SOBEL (*Archives of Pediatrics*, September, 1939) have reported upon the treatment with sulphapyridine of fifty-eight infants and children suffering from pneumonia. The drug was administered to almost all of them as soon as the clinical diagnosis was made. The patients received by mouth one and a half grains of sulphapyridine per pound of body weight for the first twenty-four hours and one grain per pound of body weight for every twenty-four hour period thereafter. The total daily amount was divided into six equal doses and administered at four hour intervals. The average period of time during which sulphapyridine was administered was three to four days. Seven patients received the drug for from five to six days and seven children received the drug for only one to two days. In two patients jaundice caused by toxic hepatitis occurred. In 54 of the 58 patients the temperature fell to normal and the patient was apparently well forty-eight hours or less after administration of the drug had been started. In 49 cases this favourable result occurred within thirty-six hours and in 35 within twenty-four hours.

JOHN A. V. DAVIES (*The New England Journal of Medicine*, November 9, 1939) records the experience gained from the treatment with sulphapyridine of 154 infants and children who were suffering from pneumonia. He concludes that it is quite evident that in sulphapyridine an extraordinarily effective agent for

the treatment of pneumonia due to pneumococci has been developed. Sulphapyridine has certain advantages over type-specific serum. It is easily administered by mouth. With rare exceptions it is apparently effective against all strains of pneumococci. This property obviates the necessity of having available numerous type-specific antipneumococcus sera. The period of greatest effectiveness is not limited to the early stages of pneumonia. It may be given to allergic and serum-sensitive patients; except in rare cases it may be given repeatedly at various intervals. It is also effective against hæmolytic streptococci. It is relatively inexpensive. If these advantages of sulphapyridine over serum are granted, the risk of toxic reactions such as hæmaturia, granulocytopenia and acute hæmolytic anemia indicates that the use of the drug should be reserved for those infants and children who are suffering from pneumonia due to pneumococci when the severity of the illness justifies the hazards of chemotherapy, light though these appear to be. Surgical complications, when vomiting could be detrimental, the failure of the patient to respond to sulphapyridine or a known idiosyncrasy or untoward reaction to the drug may now and then call for serum therapy. In regard to dosage, the author recommends an initial dose of half a grain of sulphapyridine per pound of body weight by mouth, followed by small divided doses amounting to one grain per pound per day for those under two years of age. The drug should be mixed with some semisolid food such as apple sauce or junket. Failure of the patient to respond favourably within forty-eight hours is an urgent indication, not only for a determination of the blood level of the drug as a guide to possible alterations in dosage, but also for a review of the case as to diagnosis, and especially for a careful search for complications such as empyema. In uncomplicated cases it is usually advisable to discontinue the drug after the temperature has been approximately normal for one to two days. Because of possible toxic reactions, a complete blood count at least every three days during the administration of the drug and a daily examination of the urine as long as the drug is administered and for three to four days thereafter are strongly advised. Nursing care and general supportive measures are still of fundamental importance.

#### ORTHOPÆDIC SURGERY.

##### Effect of Sclerosing Substances on Healing of Fractures.

JOSEPH NARAT AND GEORGE CHOBOT (*Archives of Surgery*, August, 1939) have studied the effect on the healing

of fractures in rats of sclerosing solutions such as those used for the obliteration of hernial sacs, and have compared the results with those obtained after injection of physiological salt solution. The treated bones were examined radiographically at intervals and histologically after the animals were killed at various intervals. Comparison of the radiographs showed no difference between the fractures treated with sclerosing solutions and those treated with salt solution, as far as time of first appearance of callus, density of the shadows or the ultimate consolidation of the fragments was concerned. In specimens treated with proliferol "T" there was a greater amount of newly formed connective tissue around the fractures, showing clinically a hard induration which probably acted as an internal splint. In spite of this proliferating connective tissue, the number of capillary blood vessels was greater than that around untreated fractures.

#### Fractures of the Pelvis.

JESSE GREENE AND DAVID SMITH (*Archives of Surgery*, May, 1939) review the results of treatment of 79 fractures of the pelvis treated at the Harlem Hospital from December, 1933, to December, 1937. The ages of the patients ranged from three to eighty-three years; 26 had no associated injuries and the average period of stay in hospital was 26 days. The average period in hospital for the remaining 53 patients was 48 days. Palpation and pressure are useful in diagnosis, but the final diagnosis depends on radiological examination which is a safer method. The most important method of diagnosing vesical injury is the taking of a cystogram, which is now done as a routine measure in the authors' cases. Vesical or urethral injury occurred in eight cases of this series. Investigation will frequently reveal neural trauma, most common in fractures of the posterior rim, the nerves most frequently involved being the lumbosacral cord, the sciatic nerve, especially its peroneal component, or the obturator nerve. Spontaneous regeneration frequently occurs. Treatment consists of rest in bed, suspension to a Balkan frame in a pelvic sling and traction on the lower limb by the Russell method. The latter should not be used if renal infection is present, as the necessary posture interferes with drainage. The authors review the literature for the past ten years and discuss various other methods of treatment.

#### Blind Nailing of T-Fracture of the Lower End of the Humerus.

O. L. MULLER (*The Journal of Bone and Joint Surgery*, October, 1939) describes a method of blind nailing for the treatment of the T-fracture of the elbow joint. He claims that his

method does not entail additional trauma to the soft parts, while, if it fails in the hands of the operator, the success of other methods of treatment is by no means jeopardized. His method of blind nailing is carried out as follows. With the patient under general anaesthesia a Kirschner wire of medium calibre is driven through the olecranon process and a wire-tightening apparatus is attached to it. With the elbow flexed to a right angle, strong traction is applied along the shaft of the humerus. This traction, plus moulding pressure over the condyles, should reduce a fresh fracture. A Kirschner wire guide is placed astride the articular processes and a wire is driven through at this level. A second wire is driven through the condyles, and a third one is inserted above the condyles to transfix at least one of the fragments to the shaft of the humerus. The wires are clipped just outside the skin, and a light arm cast is applied with the elbow flexed in the position maintained during the operation. The wire through the olecranon is left in position until X ray films have been taken. If the position of the fragments should not prove satisfactory, the method could be abandoned and the treatment continued with some form of traction. The wires are removed after four to six weeks.

#### Traumatic Dislocation of the Tendon of the Long Head of the Biceps Brachii.

LEROY C. ABBOTT AND JOHN B. DE C. M. SAUNDERS (*Surgery*, December, 1939) draw attention to the fact that acute traumatic dislocation of the tendon of the long head of the biceps brachii is a commoner lesion than was formerly supposed. After discussing the literature on the subject and the applied anatomy of the shoulder joint, they describe in detail six cases with operative findings. They point out that, as a result of their observations under the fluoroscopic screen and on patients under local anaesthesia, only one-sixth of the available range at the shoulder joint occurs in movements up to a right angle during abduction of the arm. When the arm is carried above the head to the perpendicular, motion occurs mainly at the shoulder joint accompanied, however, by further slight scapular rotation. In the six cases described the injury was followed by pain and swelling on the anterior aspect of the joint and complete disability of the affected joint. The patients complained of pain and weakness and limitation of motion in forward flexion and abduction of the shoulder. There was also pain on forced supination of the forearm against resistance with the elbow held in flexion. The principal findings were swelling over the anterior aspect of the shoulder, tenderness, most pronounced over the bicipital groove, and a snapping sensation on abduction

and external rotation of the shoulder. In all patients operation disclosed a displacement of the tendon over the lesser tuberosity. In uncomplicated dislocation the authors consider that the quickest and best resoration of function can be obtained by fixation of the tendon in the bicipital groove. When other lesions occur at the same time, such as a tear of the supraspinatus tendon, an adequate result may be obtained by replacement of the tendon and repair of the roof of the groove.

#### The Orthopaedic Treatment of Marie-Strümpell Arthritis.

LORING T. SWAIM (*The Journal of Bone and Joint Surgery*, October, 1939) has studied 106 cases of Marie-Strümpell arthritis or ankylosing spondylitis. He maintains that at first the stiffness is due to intense, prolonged spasm of all the spinal and abdominal muscles, and that this spasm exists for some years before the ossification takes place. The author's theory is that ossification of the spine represents the result of Nature's method of permanent immobilization to prevent strain and motion and inflammation in the ligaments. Prior to 1930 forty-five patients were treated by orthopaedic measures in an attempt to prevent the usual deformity of rounded thoracic spine, flat upper portion of the chest and buckled body, with protruding head and sometimes fused hips. The patients were kept recumbent and the spine was hyperextended by gradual removal of the pillows and by the use of plaster half shells. In addition hot fomentations to the spine were used and corrective exercises were given twice daily. When the back was as straight as it seemed possible to make it, steel braces which drew the shoulders back were used. Of the forty-five patients, thirty-five had completely fused spines and thirty-one had poor posture in spite of treatment. These results were so poor that a better method had to be devised; therefore jackets were tried. The poor spinal posture was corrected as before and the jacket was applied with the patient on a Goldthwait frame. The jacket is moulded tightly over the abdomen to limit abdominal breathing, to force the chest up, and to compel upper expansion of the chest; it is left high in front and cut just below the scapulae at the back. It extends to the symphysis pubis and the tip of the spine below. The jacket is not removed for several weeks and then succeeding jackets are applied until the best possible correction has been obtained. This is followed by a more permanent leather jacket which is worn continuously. All the patients who have been cooperative are still wearing their jackets and some have retained them for nine years. The author states that the results following the use of the jackets are superior to those which were obtained in the forty-five cases previously treated with other forms of support.

## British Medical Association News.

### SCIENTIFIC.

A MEETING of the South Australian Branch of the British Medical Association was held on October 26, 1939, at the Institute of Medical and Veterinary Science, Adelaide, Dr. M. ERICSSON, the President, in the chair.

#### Intestinal Obstruction.

DR. I. B. JOSE read a paper entitled "Intestinal Obstruction" (see page 215).

DR. N. J. BONNIN read a paper entitled "The Pre-Operative and Post-Operative Treatment of Intestinal Obstruction" (see page 219).

DR. A. BRITTEN JONES said that owing to health reasons he had been unable to accept the honour of delivering that evening's paper, and he took the opportunity of personally thanking Dr. Jose and Dr. Bonnin for having taken up the reins on his behalf at comparatively short notice. He congratulated the speakers on their excellent exposition of a difficult subject. He mentioned that within the relatively short space of a decade the Parent Body of the Association had thought fit to have a general discussion on the subject of intestinal obstruction on two occasions at its annual general meeting. The main conclusions arrived at could perhaps be summed up in the words of the late John D. Murphy: "Procrastination is the greatest cause of the high mortality rate in intestinal obstruction—delay in diagnosis and delay in operating is the most frequent cause of death." Sir Henry Newland in his opening paper on the subject in London, in 1933, discussing the question of diagnosis, enjoined them all to cultivate the "seeing eye"; and Dr. Britten Jones suggested that they should not neglect the "hearing ear", for the correlation of colicky abdominal pain with intestinal tinkling and gurgling in the absence of enema results was indicative of mechanical obstruction of the bowel. The importance of the two-enema test had been stressed by Dr. Jose, and Dr. Britten Jones mentioned a recent case of intermittent small bowel obstruction by a gall-stone, in which he had subsequently been able to come to a correct diagnosis as a result of keen observation on the part of a nurse, who had discovered the presence of a small gall-stone after straining an enema result.

With regard to the age of incidence of that type of obstruction, Dr. Britten Jones said that he thought that it occurred at a later age period than Dr. Jose had shown on his chart. The question of anaesthesia was a most important one; and Dr. Britten Jones said that he favoured local field block used in conjunction with the intraperitoneal injection of "Percaïne" in those cases which were unsuitable for spinal anaesthesia.

DR. R. G. BURNARD congratulated the speakers on the excellence of their addresses. He asked Dr. Jose whether there was any place in the treatment of these conditions for those drugs which stimulated the autonomic nervous system. In a recent case of paralytic ileus following a hysterectomy, in addition to following out the treatment along the lines laid down by the speakers he had given the patient injections of "Esmodil"; and it seemed, by the prompt and copious evacuation of the bowel, that this had been a help to her subsequent recovery. Dr. Burnard thought that there was a need in medicine for such drugs, the prototype of which was prostigmin, and he asked whether their use especially in paralytic ileus was of advantage or to be deprecated.

DR. M. T. COCKBURN pointed out that the oedema which sometimes occurred during prolonged infusion was not due to retention of chlorides, but to a lowering of the level of proteins in the serum. The patient in these cases was supplied with adequate amounts of water, salts and carbohydrates, but no protein was provided. Blood

transfusion was the only satisfactory way of supplying protein, and it was also a remedy for the oedema. During the administration of a massive intravenous infusion it was often useful to open the stop cock controlling the rate of flow at intervals of three or four hours and to allow the fluid to run freely for ten seconds or so and thus flush the needle tip from any sedimenting red cells.

#### Imperforate Anus.

DR. IAN HAMILTON showed a female patient with an imperforate anus. The child, now aged five years and in excellent health, had been referred to him when she was only a few days old, on account of an imperforate anus causing intestinal obstruction. An operation in the usual manner had been performed, an opening had been made into the rectum and a certain amount of drainage had been obtained. Prior to the operation a trace of meconium had run from the vagina; this indicated the presence of a recto-vaginal fistula. However, the relief of the imperforate anus had not cured the obstruction, so a couple of days later a caecostomy was performed. The child survived, and when she was about a month old a permanent left iliac colostomy was made. At that operation the sigmoid colon was noticed to be contracted and cord-like, a true congenital atresia. Since then the child's progress and growth had been normal, and at present she was in excellent mental and physical health. An X ray picture now revealed a normal ascending, transverse and descending colon proximal to the colostomy. Distal to the colostomy there was a portion of the sigmoid colon, about three or four inches in length, which was extremely narrowed, but allowed the barium to pass along it. Beyond this the rectum was normal and led down to a narrow anal canal.

Dr. Hamilton asked for any suggestions. He stated that his intention was to wait another couple of years and then to stretch the anus gradually and to perform a double-barrelled transverse colostomy. Then at a later date the left iliac colostomy would be excised with the atresic bowel, the descending colon and the rectum would be mobilized and an end-to-end anastomosis would be performed. Later the transverse colostomy would be treated by having the spur crushed and the colostomy closed in the usual manner.

Several of those present agreed that this would probably be the best course to follow.

#### Rhinoplasty.

Dr. Hamilton also showed photographs of a patient who was having a partial rhinoplasty performed. He stated that one *ala nasi* had had to be removed for the cure of a radio-resistant rodent ulcer which had invaded the cartilage. When the wide excision was performed a flap of corresponding size on the forehead had a Thiersch graft, raw side out, implanted under it in order to epithelialize the inner surface of the area which would be transferred to fill the defect in the nose. Twelve months later a long forehead flap was raised in steps, then swung across to the nose and sutured in place after suitable preparation. This was left *in situ* for a fortnight, and then the surplus flap was returned to the forehead. The defect in the forehead left without epithelium was filled by a whole-thickness skin graft from the arm. At no step was any tissue lost nor did any infection or other complication occur; and although the new *ala* was not exactly as good looking as the old one, the result was highly satisfactory.

Dr. Hamilton remarked that the forehead flap method was one of several employed for partial rhinoplasty; some plastic surgeons preferred a neck flap, as it tended to leave a less visible scar; but it was surprising what little visible scarring resulted from the use of forehead and scalp flaps. Dr. Hamilton considered that it was of tremendous importance to have satisfactory epithelialization of the deep surface of the graft before the nasal part of the work was commenced, in order to avoid infection, scarring and contraction.



## Medical Societies.

### MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held at the Children's Hospital, Carlton, Melbourne, on June 14, 1939, Dr. D. O. BROWN, the President, in the chair.

#### Diseased Tonsils and Tonsillectomy.

DR. STANLEY WILLIAMS showed a series of patients illustrating diseases due to streptococcal infection in the throat. One was a girl, aged eleven years, who had been debilitated for three months after an attack of scarlet fever. She had complained of pains in the ankles. Her tonsils were of medium size and showed evidence of chronic infection. Another was a boy, aged three years, who had developed acute nephritis one week after an attack of acute tonsillitis. His two sisters had been treated for scarlet fever. The other patient, a boy, aged eleven years, had developed myocarditis three weeks after acute scarlet fever.

Dr. Williams commented that that complication of scarlet fever was clinically indistinguishable from the lesions found in many instances of acute rheumatic fever. He said that the three children exemplified diseases which were known to be due primarily to hæmolytic streptococcal infection of the pharynx and tonsil. It was desired that the part played by the tonsils in the development of disease should be the topic for discussion at the meeting.

At that stage Dr. Williams introduced Dr. E. V. Keogh, saying that Dr. Keogh had spent much time and thought on a bacteriological investigation of tonsils removed at the Children's Hospital and elsewhere.

Dr. E. V. Keogh reported the results of the bacteriological examination of 378 pairs of tonsils removed in the routine practice of the Children's Hospital, Melbourne. The investigation had been undertaken originally as part of a survey of the types of hæmolytic streptococci in Melbourne, which had been in progress at the Commonwealth Serum Laboratories for the past year. The findings had some bearing on the clinical indications and were discussed from that angle.

Dr. Keogh said that hæmolytic streptococci had been isolated from 68.5% of the tonsils. From 50% of them, streptococci belonging to Lancefield's serological group A were isolated, the streptococci from the remainder belonged to groups B, C and G. Group A included the human pathogenic strains; the streptococci of groups B, C and G were only rarely responsible for serious disease in man. The incidence of pathogenic group A streptococci was ten times higher in that group of excised tonsils than in the throats of healthy children in Australia. The incidence of the doubtfully pathogenic strains of groups B, C and G was the same in excised tonsils as in normal throats. The pathogenic streptococci were present in large numbers, forming 50% or more of colonies on the plates from about 25% of the tonsils.

A study of those results led Dr. Keogh to suggest that about one-third to one-half of the children recommended for tonsillectomy at the Children's Hospital had streptococcal infection of the tonsils. He added that evidence was available in a group of eleven children to show that the same serological type of streptococcus had been present in the tonsils for several months. Owing to the long interval elapsing between the recommendation for operation and its performance, it seemed likely that many of the remaining children were also suffering from chronic streptococcal tonsillar infections. During a detailed investigation of an institutional outbreak of scarlet fever, the workers at the Commonwealth Serum Laboratories had not found sulphanilamide therapy successful in the treatment of persistent tonsillar carriers of streptococci.

Dr. Keogh expressed the opinion that in the present state of knowledge tonsillectomy appeared to be the only efficient treatment for such carriers. During the investiga-

tion previously mentioned it had been found that while children whose tonsils had been removed were just as susceptible to streptococcal throat infections as normal children, their infections cleared up more quickly. In conclusion, Dr. Keogh stated that the investigations had been carried out by several workers at the Commonwealth Serum Laboratories, including Dr. Ian Macdonald and Dr. Stanley Williams, Dr. Williams being the link between the two institutions. On the basis of the results it was hoped to continue the study, and to attempt to correlate the clinical and bacteriological findings.

Dr. RAYMOND HENNESSY, before enumerating and commenting on clinical indications for tonsillectomy, said that he wished to make a few remarks. There were as many jokes in medical circles about tonsillectomy as about Ford motor cars; nevertheless, it was an operation which, performed in selected cases, gave admirable results. It was undoubtedly a "best seller" amongst surgical operations, and most young doctors tried their prentice hand on it.

It was a matter for comment that the palatine or faucial tonsils formed only a part of what was known as Waldeyer's ring, the other two components being the lymphadenoid tissue in the posterior nares, colloquially known as adenoids or post-nasal growths, and that on the posterior third of the tongue, known as the lingual tonsil. It was a coincidence that the faucial tonsils, besides being charmingly accessible, were the only components which were known clinically to cause severe local and constitutional symptoms. There were few minor illnesses which so quickly transferred a healthy person into a parlous condition than an acute attack of follicular tonsillitis. The reason was that the palatine tonsils were most intimately connected with the lymphatic and circulatory systems. A very severe degree of sapræmia developed, or even at times a mild septicæmia. Acute inflammation of the other components of Waldeyer's ring was not known clinically to cause such severe or dangerous constitutional symptoms.

Dr. Hennessy went on to say that it was important to realize that all surgical operations might be divided into two groups: those of necessity and those of choice. Examples of operations of necessity would be those for a strangulated hernia or a perforated viscus, conditions which were usually fatal if not treated surgically. In his opinion, the operation of tonsillectomy could never be considered as other than an operation of choice. Therefore it was always necessary seriously to consider what were the indications for operation and what benefits were likely to result from it.

Age was always an important consideration in any operation of choice. It might be said at once, since the operation of tonsillectomy had become standardized, that it was so safe that it might be performed at any age without risk to life. Nevertheless Dr. Hennessy was of the opinion that tonsillectomy, if contemplated in children, should be deferred if possible until the age of five or six years. At that age the child's habits of life changed very materially. The child would be going to school and was necessarily much more exposed to infections such as measles, scarlet fever and diphtheria. He also had reason to believe that complete tonsillectomy performed in infants of tender years predisposed them subsequently to sinus disease. Perhaps the denuding of the pharynx and nasopharynx of all lymphoid tissues removed an important barrier of defence. He had always been strongly opposed to anything of the nature of routine tonsillectomy. Therefore he ventured to submit the following indications, which he believed made tonsillectomy advisable or desirable.

Dr. Hennessy then said that the size of the tonsils might, in certain circumstances, warrant their removal. They might be so large as to interfere with breathing, speaking or swallowing. This might be so even in children under the age of three years.

Dr. Hennessy further said that repeated acute attacks of tonsillitis were an indication for operation. It was a fact that the commonest cause of acute inflammation of any organ was a previous attack of acute inflammation.

That was very well illustrated in the tonsil. It was common for an individual who had his first attack of tonsillitis in adult life to have subsequently a series of acute attacks at short intervals.

Quinsy was always a satisfactory reason for advising tonsillectomy. It was well known that quinsy tended to recur, and no patient would voluntarily go through more than one attack of quinsy when tonsillectomy was a certain means of avoiding it.

Another indication for tonsillectomy was some middle ear disorder, for instance, an otorrhoea which failed to disappear and which cleared up rapidly after successful removal of tonsils and adenoids. Although this was more commonly seen in childhood, adults benefited in the same way. Lesser degrees of middle ear or tubal deafness were frequently relieved by tonsillectomy. The most satisfactory results followed tonsillectomy when there was some chronic enlargement of the cervical glands; in fact it was the satisfactory results of tonsillectomy observed in cases of cervical adenitis which were responsible for general surgeons' turning their attention to this matter and making the change from the guillotine to the dissection operation. There was a gland situated in the angle between the internal jugular and common facial veins which received practically all the lymphatic drainage from the tonsils; it was called the tonsillar gland and it was the first to be enlarged. Twenty-five years ago one of the commonest operations in the out-patients' department was the removal of enlarged and tuberculous cervical glands. Nowadays this operation was rarely necessary on account of the improved methods of dealing with the source of the infection, namely, the tonsils. It was extraordinary how even very large glands in the neck would disappear after tonsillectomy. If the resistance to tuberculosis was poor the satellite glands might disappear while the tonsillar gland caseated. The softened material could be evacuated through a small incision in the neck, which might heal by first intention.

Some little children suffered from repeated attacks of fever; there was a rapid increase of temperature with very few other symptoms. The child might not even complain of a sore throat. Nevertheless, inspection of the fauces would show that some congestion and inflammation of the tonsils were present. It was always worth while to consider the tonsils as a cause of these unexplained febrile attacks in children between the ages of four and eight years.

Dr. Hennessy then said that tonsillectomy had enjoyed a favourable reputation in rheumatism and allied conditions. Whilst undoubtedly there were more failures than successes, there was incontestable evidence that some of these conditions were caused by infection from the tonsils. Repeated attacks of acute sinusitis occurring in adults could often be attributed to latent infection in the tonsils. The sequence of events was the following. The symptoms began with a sore throat caused by tonsillitis and pharyngitis. The infection spread into the naso-pharynx and then into the sinuses, causing empyema of the antrum. After a series of these attacks tonsillectomy often gave the happiest results.

There were some surgeons who held that tonsillectomy was an essential step in the operative treatment of cleft palate. They believed that the presence of the tonsils was prejudicial to the healing of the wound, and that the tonsils were apt to become infected during the convalescence, jeopardizing the success of the operation. After diphtheria it was well known that sometimes the tonsils harboured the bacilli and patients became diphtheria carriers. Tonsillectomy was often the only satisfactory way of dealing with this condition. When the follicular debris of the tonsils accumulated and became inspissated the condition corresponded with blackheads in the skin and might be called whiteheads of the tonsils. Some patients became very expert at expressing them from the crypts of the tonsils with the handle of a toothbrush or some other domestic instrument. When this material underwent decomposition it had a disgusting and penetrating odour and caused tainting of the breath. Under

conditions of private practice this constituted a valid reason for tonsillectomy.

In conclusion Dr. Hennessy said that there was a motley and amorphous collection of conditions known as focal infections. It was impossible to discuss them in the time at his disposal. Practically every disease in the body at some time or other had been suspected of being due to infected tonsils. Indiscriminate operation for these conditions in the past had helped to give tonsillectomy a bad name. Nowadays, he thought that more restraint and judgement were shown than formerly in this respect.

Dr. W. KENT HUGHES, after thanking those who had opened the discussion, commented on the results that could be expected to follow the widespread application of preventive measures in medicine. He said that typhoid fever had almost disappeared and the incidence of diphtheria had fallen considerably; the disease would have almost gone by now if the campaign of prevention had been pursued more energetically. It was a satisfaction to him to recall that he had introduced wholesale immunization against diphtheria when he was in the Melbourne City Council. He followed the reports of Dr. Dale which were issued from time to time and was glad to note that deaths from diphtheria among those immunized scarcely ever occurred. On the other hand the incidence of scarlet fever had not decreased to any extent in the past thirty years and wholesale tonsillectomy had failed to make any favourable influence on it. He was glad to hear Dr. Hennessy say that he liked to postpone operative removal of tonsils till the child was five years of age. Dr. Kent Hughes would like to see the operation postponed at least another two or three years, and by that time he thought that in most instances the indication to operate would not arise. Gradually enlightened opinion in England was swinging around to the attitude of conservatism observed by Kayser and others.

Dr. Kent Hughes expressed the opinion that catarrh was the chief excuse for removal of tonsils and adenoids, but that the operation only temporarily improved nasal sinusitis. Against the view that sinusitis caused enlargement of the tonsils and adenoids could be quoted the evidence of Dr. Cantor and Dr. Hennessy at a previous meeting of the Melbourne Paediatric Society. They had found many examples of sinusitis unaccompanied by hypertrophy of the tonsils and adenoids, but had not stated whether they had found the hypertrophy without the sinusitis. He wished to draw attention to the point that if the sinusitis could be cleared up the necessity for the removal of the tonsils and adenoids would usually cease to exist.

Dr. Kent Hughes asked Dr. Hennessy whether he still favoured the opening of a quinsy and delay in the removal of the tonsils till afterwards, and reminded him that he, Dr. Kent Hughes, had practised prompt tonsillectomy ever since 1899. He also stated that he had never yet failed to clear up enlargement of the glands of the neck of tuberculous origin by means of Spengler's I.K. therapy. He observed that there had not been any noticeable diminution in the incidence of rheumatic fever as a result of wholesale tonsillectomy, and stated that diathermy treatment was excellent for the treatment of sinusitis in children. As a preparatory precaution before a cleft palate operation, when necessary, he would prefer to attend to the antra than remove the tonsils.

Dr. H. McLORINAN observed that the amazingly high proportion of group A streptococci that had been reported by Dr. Keogh as obtained from the tonsils was evidence of excellent diagnosis at the Children's Hospital. From the public health standpoint and bearing on the question of the removal of tonsils he was able to say that the persistence of streptococci in infected tonsils was the cause of the continued growth of organisms in cultures from the throat and naso-pharynx. The removal of the tonsils facilitated the achievement of attempts at culture that failed to grow organisms, so that the patients could be discharged earlier from the Queen's Memorial Infectious Diseases Hospital and be allowed to return to their homes. From the point of view of the individual it

was not so easy to decide the question; an immunizing process was going on at the same time as the tonsillar enlargement. The carriers of streptococci were not always in ill health; but it had to be remembered that streptococcal infections predisposed to remote effects such as rheumatic fever and nephritis. Allergic explanations were favoured in nephritis, and tonsillectomy was disappointing as a means of curing nephritis. The tonsil was the first line of defence, and if it was removed it became more likely that the remaining lymphatic tissues in the pharynx and post-nasal spaces would become involved. From the clinical point of view it had been observed that if children who had been subjected to the operation got scarlet fever the picture was characteristic. They manifested nasal obstruction, nasal discharge and red nostrils; the inflammation spread to the rest of the lymphoid tissues; the lingual tonsils became visible, the pharynx granular and the adenoid tissue hyperplastic; then the sinuses were invaded and the Eustachian tubes and the ears were apt to discharge. If the argument was advanced that the tonsils and adenoid were removed for sinusitis, it was apparent that the removal had not improved the sinusitis. Dr. McLorinan thought that conservatism in the matter of operating on tonsils and post-nasal spaces was popular and had spread all over the world. He had noted recently, at the Presbyterian Hospital in New York, that all children who were candidates for the operation were referred to paediatricians. The tonsil was not the despised organ that used to be at the mercy of anyone with a guillotine.

DR. G. RALEIGH WEIGALL expressed the view that the wave of conservatism about the routine removal of tonsils had been moving for twenty years. Dr. Hennessy had seemed to belittle the importance of follicular exudates which he had likened to harmless blackheads; surely they must bottle up bacteria and force them into the blood stream in a way analogous to that of apical dental infections. Dr. Weigall thought that the subsequent development of conditions such as rheumatic fever and nephritis were indications of the truth of that view. He also entered a plea for the use of the guillotine method rather than the dissection method in selected cases in childhood. Bad operating should not be placed to the discredit of the guillotine, which could be used at least as satisfactorily as the more elaborate method. Dr. Weigall went on to speak warmly of the virtues of sulphanilamide treatment in tonsillar infections and stated that he had had some remarkable results. He added that it was his habit to prescribe *Liquor Hydrargyri Perchloridi* as well. In conclusion, Dr. Weigall asked whether it was still the conception that scarlet fever could be distinguished clinically from the rash associated with a septic throat.

DR. J. W. GRIEVE said that he was in entire agreement with the view that tonsillectomy should not be undertaken lightly. He regarded the operation as a means of minimizing the duration of the infection.

DR. GUY SPRINGTHORPE said that the removal of tonsils might at times be necessary as a diagnostic measure to determine the exact nature of the infecting streptococcus, which might have a bearing on success in treatment.

DR. CLIVE FITTS expressed wonder that people could describe throat infections as streptococcal without the aid of bacteriology and even go so far as to say that sulphanilamide cured such infections.

DR. C. M. EADIE said that the longer the tonsils and adenoid tissue could be left alone, the better the child would thrive; but it was undeniable that debilitated and under-nourished children frequently improved after tonsillectomy. He did not like to leave cheesy exudates in the tonsils, though he did not regard them as evidence of streptococcal infection. He thought that in most cases the tonsillar infection was secondary to the sinusitis when both were present, and that removal of the tonsils was not curative but might be harmful. The patients seemed to make better progress if they had some lymphoid tissue there and to suffer if the protecting barrier was removed.

DR. H. DOUGLAS STEPHENS spoke on the question of removal of tonsils as a preliminary to cleft palate repairs. He said that with the entrance of air through a wide cleft it was an excellent practice to remove the tonsils. The routine was started as a fashion in London and at least one man there still continued it. Dr. Stephens had tried it, but as he usually performed the cleft palate operation at the age of two years he rarely saw evidence of infection of the tonsils. Further, by leaving the tonsils he had found that there was less contraction of the anterior and posterior pillars and he was of the opinion that infection of the operation field, when it occurred, was due to tension and not to tonsillar sepsis. If the tonsils were to be removed, the operation could be performed at a later date.

DR. D. O. BROWN, from the chair, spoke of the way in which the pendulum had swung from radicalism to conservatism over the question of the removal of tonsils. The operation as a panacea to stop the frequency of colds was a straw upon which it was not safe to lean; indeed, the operation might do harm and make the patients more prone to the colds that produced chronic sinusitis. All were more or less in agreement that the removal of tonsils and adenoids should be avoided while the children were very young. In the presence of *otitis media*, on the other hand, he thought it was good practice to perform the operation and then to send the child for a holiday. By that means the *otitis media* would clear up and the necessity for a mastoid operation would not arise. He gave as an example brief details of a case in which the ear had been discharging for three years, but had cleared up in three days after the operation and no further trouble had arisen. In conclusion, Dr. Brown suggested that Dr. Keogh and his fellow workers should carry on the bacteriological investigation of living tonsils as it was probable that information of value would accrue.

Dr. Stanley Williams added that they had not found sulphanilamide treatment satisfactory in acute tonsillitis; it had not proved of distinct value, though the substances might have been used in insufficient dosage. He stressed the tremendous assistance of the skilled laboratory worker to the clinician.

DR. KEOGH pointed out that he had not been speaking in favour of tonsillectomy. In Victoria between 15% and 17% of school children had their tonsils removed. It was his view that if all the tonsils were taken out all the streptococcal infections would disappear, including puerperal sepsis; but such an ideal could be attained only in a totalitarian State, in which a person with his views was the dictator. He was under the impression that sinus infection was usually due to pneumococci and tonsillar sepsis to streptococci. He would like people to speak of "septic" sore throats rather than "streptococcal" sore throats in the absence of bacteriological information.

DR. HENNESSY said that as the hour was late he would merely thank those who had taken part in the discussion.

#### Pathological Joint Conditions in Childhood.

DR. WILFRED FORSTER showed four patients to illustrate some pathological conditions of joints in childhood. He indicated that the first three formed a group and that the fourth patient was not related clinically to the others.

DR. FORSTER'S first patient, a boy, aged seven years, had for two years had attacks of swelling of the left knee joint usually associated with a slight injury. The swelling occurred quite rapidly, the whole joint being distended and painful with a few degrees of flexion deformity. It remained for between seven and fourteen days and then subsided, leaving the joint practically normal between the incidents. The boy was easily bruised, and on one occasion when he had a small cut on his lip he had to be kept in bed for seven days to control the bleeding. There was no family history of a tendency to bleed. While the boy was undergoing an investigation of the condition on one occasion the left ankle joint had been swollen as well as the knee joint. On examination at the



hospital it had been noted that the boy was slightly pale and that the knee was flexed at 25° from the horizontal. There was fluid in the knee joint causing a swelling confined to the outline of the joint and limiting the range of movement. All the structures in the joint were slightly larger than those of the opposite side. The serum had failed to react to the Wassermann test; the bleeding time was two minutes; the coagulation time was prolonged to eleven minutes and a negative result followed the carrying out of the Mantoux skin test with a dilution of one part in one thousand. The report on the skiagrams of the knee joint drew attention to the narrowing of the joint space with erosion of the opposing cartilaginous surfaces of the femur and tibia. Those findings were consistent with the diagnosis of tuberculous disease of the joint. Dr. Forster said that in *Annals of Surgery*, in 1932, Key had pointed out several radiographic features which were almost diagnostic of hæmophilia. Those features could be identified in the skiagrams displayed by Dr. Forster. They were: (a) increase in the size of both the epiphyses of the femur and the tibia; (b) definite increase in the density of the joint capsule; (c) irregularity of the bony surfaces, articular and extraarticular; and (d) the occurrence of a large area of bone absorption in the intercondyloid fossa and the surrounding of that area by a thin line of denser bone. Dr. Forster added that Key propounded several theories to explain the area of absorption and surrounding density, the one favoured being that hæmorrhage had occurred in that site with gradual absorption of bone by macrophages which also removed blood pigment. Dr. Forster considered that he could make the diagnosis of hæmophilia with reasonable certainty; he had taken the steps necessary to place the joint at rest and invited suggestions as to further treatment.

The next child shown was a boy, aged four years, who had had swelling of the left knee joint and some limitation of movement for one month; but there was no history of injury. The boy's father was suffering from pulmonary tuberculosis. He had been in a sanatorium, but had returned home and had been living with the family. A Mantoux skin test performed on the boy elicited a strongly positive reaction in a dilution of one in one thousand parts. The Wassermann test had elicited no reaction with his serum. The knee joint was swollen, and movement was limited and painful, but no crepitus had been detected. No definite bony changes had been demonstrable radiographically, though swelling of the soft tissues was apparent. Dr. Forster said that he had removed a gland from the groin, and that on examination of macroscopic and microscopic sections Dr. Reginald Webster had reported the presence of tuberculous caseous foci, and had demonstrated the presence of tubercle bacilli in microscopic sections that had been specially prepared. Dr. Forster added that the condition was typically tuberculous and that it was quite usual to obtain a history of contact with a tuberculous member of the family.

The next patient in the series shown by Dr. Forster was a boy, aged nine years, who had come to the hospital eight months before the meeting with a swollen wrist joint which was painful and limited in the range of movement, particularly on flexion. The Mantoux skin test had elicited a positive reaction in a dilution of one part in one thousand, and the boy's temperature persistently varied between 37.4° and 37.8° C. (99.2° and 100° F.). The report on the skiagrams of the wrist was that the appearances were suggestive of tuberculous disease. A radiographic examination of the chest was made and the opinion was expressed that the hilar glands were a little swollen, but that no evidence was observed of any deposit in the lung parenchyma.

Dr. Forster said that he showed the patient because in a series of skiagrams it was possible to show that the lesion in the wrist was progressing favourably with definite signs of healing. In his experience of comparable wrist conditions as a rule the progress was in the other direction. He realized that he had formed that view chiefly from observations on adult patients; they had

frequently developed sinus formation and had finally required an operation for excision of the wrist joint. The result in the case under review had led him to doubt the diagnosis. He had, however, excised a gland from the axilla; this had been examined by Dr. Reginald Webster, who had reported that it was undoubtedly tuberculous.

The last patient shown by Dr. Forster was a girl, aged twelve years, who had been transferred to his clinic on account of the fact that she had an old fracture of the left wrist which had been treated only by a pharmacist. It was found that she had had a very mild injury, one hand twisting across the other when she was riding a bicycle. The injury was not a satisfactory explanation of the condition found on examination. The whole forearm was shortened, being one and a half inches less in length than the opposite one, and lateral and anterior bowing of the shaft of the radius was present. The distal extremity of the radius was irregular in shape, the ulna projected forward on the volar surface of the wrist joint and the hand had the "dinner fork" deformity of a Colles' fracture in contradistinction to the "bayonet" shape of the axial Madelung's deformity. Dr. Forster said that, on reference to the literature, he had found an article in *Annals of Surgery* of September, 1938, by Anton, Ritz and Spiegel of Brooklyn, which contained a summary of 173 cases of Madelung's deformity culled from the literature. In that article the whole subject was discussed, and it was reported that 127 of the cases were bilateral and 142 unilateral. Only five of the 173 cases were of the rare "reversed" Madelung deformity. Dr. Forster believed that the patient shown by him was another example. He described the appearances in the skiagrams as typical and directed attention to the following features: (a) comparative shortening of both bones of the forearm on the affected side; (b) lateral and anterior bowing of the shaft of the radius; (c) gross obliquity of the epiphyseal line of the distal part of the radius with disappearance of the epiphyseal line towards the medial or ulnar side; (d) the appearance of bone absorption of the shaft on the medial side of the radius close to the junction of the distal epiphysis and the diaphysis; (e) volar projection of the ulna instead of the usual dorsal projection of the common type of Madelung's deformity; (f) pyramidalization of the carpal bones, the lunate becoming the apex of the pyramid.

Dr. Forster added that the explanation given for the "reversed" Madelung condition was that the dorsal side of the epiphysis fused early, causing the growth of the volar aspect to tip the wrist backward and the ulna to project on the volar surface.

Dr. E. E. PRICE spoke first about carpal arthritis. He said that when it was due to tuberculosis the tendency was not towards improvement, so that it differed in that respect from the condition in the patient shown by Dr. Forster. He recalled an example at the Frankston orthopaedic branch of the Children's Hospital in which a child who had been undergoing treatment for six months had surprised him by recovering; on that account he had decided that the condition was not tuberculous. He had not removed a gland for biopsy examination. He would be interested to know a great deal more about the lymphatic drainage of bones and joints. Dr. Price then said that he had observed, in the case of the patient shown last by Dr. Forster, that there was some clinical evidence that a similar deformity was occurring in the other forearm. He would like to know what the primary cause was; it seemed to him to be connected with a lack of growth of the ulna.

Dr. BRYAN KEON-COHEN said that he had found the presentation of the patients most interesting. They served to demonstrate a number of difficulties in diagnosis based on radiography. The second patient shown by Dr. Forster illustrated the point that especially in tuberculous lesions of the knee joint no diagnostic changes might appear in the skiagrams for a considerable time after the condition could be proved to be tuberculous; the visible changes were confined to the synovial membrane and any bone change apparent was compatible with disuse. With reference to

the condition of the wrist joint of the third patient shown by Dr. Forster. Dr. Keon-Cohen said he had seen many instances of tuberculous lesions in that situation which appeared to be cured for a time. If it was a tuberculous lesion he would be chary of giving an optimistic prognosis, as recrudescence was likely to occur when movement of the joint was allowed.

Dr. J. B. COLQUHOUN recounted some of the details of a patient in his care some eight or nine years earlier. The appearances in the skiagrams had been very similar to those in the skiagrams shown by Dr. Forster. The knee joint was tapped and from the fluid tubercle bacilli had been cultured. The child was then sent to the Frankston Orthopaedic Hospital, and after a period of two years there undergoing treatment, had ultimately obtained a full range of movement. The patient had been seen by Dr. Colquhoun within the past six months and was able to skate and dance without disability. There had been no radiographic evidence of bone involvement. Dr. Colquhoun had been much impressed with that case. It had suggested to him that the therapeutic test of cure should be applied before a good prognosis was given; the condition was apt to light up again when the affected knee was used freely. Dr. Colquhoun also referred to the clinical observation that the limb on the infected side might increase in length by one inch or more in two years owing to enlargement of the epiphysis. He commented on the desirability of supplying to the radiologist the essential clinical evidence in an attempt to overcome diagnostic difficulties. With reference to the child with an infected wrist joint shown by Dr. Forster, Dr. Colquhoun considered that the condition was still acute and might break down and become active. Any improvement that might be noted in tuberculous disease of bones or joints during the first six months of treatment did not justify a sanguine prognosis. Commenting on the patient with a deformity of the forearm, Dr. Colquhoun suggested the possibility that the deformity might be due to trauma with premature fusion of the epiphysis and the metaphysis or to coecal infection and premature fusion.

Dr. H. Douglas Stephens said that the tuberculous lesion in the wrist joint was at an early stage. He added that wrist joints and ankle joints were in the habit of undergoing a long initial stage before the main activity was manifested. He also said that he knew of two boys who became well able to play football in spite of having had tuberculous knee joints early in life.

Dr. RUSSELL HOWARD confined his remarks to the treatment of the last patient shown by Dr. Forster. There was diminution of growth of the ulna on the affected side amounting to a shortening of one and a half inches in comparison with its fellow. The deformity was progressive. It did not seem right to him that nothing should be done to stop the progress. It had occurred to him that removal of a corresponding length of the radius would have that effect.

Dr. J. G. WHITAKER said that he and Dr. Colin Macdonald had been wondering whether the deformity at the wrist could be classified as an example of dyschondroplasia.

Dr. D. O. BROWN, from the chair, before asking Dr. Forster to reply to the discussion, spoke of his interest in gland biopsy in the diagnosis of tuberculous disease. He had been present in Drake's native city when H. J. Seddon had read a short paper on the subject, stating that there was unequivocal microscopic evidence of the presence of tubercle bacilli in at least half the inguinal glands examined. Dr. Brown had noted that in the past three or four months Dr. Reginald Webster had carried out the procedure advocated by Seddon and had recovered tubercle bacilli from five out of the six glands examined. The procedure involved the use of one-half of the excised gland for the preparation of sections and of the other half for culture purposes. Surgeons were very disturbed about the question of lymphatic gland drainage in diseases of the bones and joints. For example, it was hard to understand why the inguinal glands had tubercle bacilli in them

though abscesses and other inflammatory changes did not occur clinically.

Dr. Forster, in reply, pointed out that the establishment of the presence of tuberculous infection of the axillary gland was not incontestable evidence that the lesion in the wrist joint was tuberculous; he had not been able to feel an epitrochlear gland in order to remove it and thus had excised one from the axilla. He went on to say that the authorities he had consulted all laid the blame on the radius as the primary cause of deformity in Madelung's disorder. The chief suggestion as to treatment was the removal of a wedge-shaped piece of bone from the lower end of the radius. He, too, thought that the other wrist would become deformed.

## Naval, Military and Air Force.

### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Numbers 2, 4, 9 and 13, of January 4, 11, 18 and 25, 1940.

#### PERMANENT NAVAL FORCES OF THE COMMONWEALTH (SEA-GOING FORCES).

##### Transfer to Retired List.

Surgeon Commander Francis Joseph Matthews is transferred to the Retired List, dated 26th December, 1939.

#### THE SECOND AUSTRALIAN IMPERIAL FORCE.

##### Australian Army Medical Corps.

*To be Captains*—Captains J. B. Somerset, Australian Army Medical Corps, 3rd Military District, and P. Braithwaite, Australian Army Medical Corps, 6th Military District. Honorary Captain R. R. Andrew, Reserve of Officers (A.A.M.C.), 5th Military District, 13th October, 1939.

*To be Colonel*—Lieutenant-Colonel J. Steigrad, 13th October, 1939.—(Ex. Min. No. 16—Approved 22nd December, 1939.)

*To be Colonel*—Lieutenant-Colonel (Temporary Colonel) H. C. Disher, Australian Army Medical Corps, 3rd Military District, and to be Assistant Director of Medical Services, Headquarters, Australian Overseas Base, 13th October, 1939. *To be Lieutenant-Colonels*—Edmund Britten Jones and Captain (Honorary Major) A. S. Walker, Reserve of Officers (A.A.M.C.), 2nd Military District, 13th October, 1939. *To be Majors*—Lieutenant-Colonel H. C. Nott, Reserve of Officers (A.A.M.C.), 4th Military District, and to be Honorary Lieutenant-Colonel, 13th October, 1939 (this cancels the notification respecting this officer which appeared in Executive Minute No. 12/1939, promulgated in *Commonwealth Gazette* No. 167, of 14th December, 1939); Lorimer Fenton Dods, Ashleigh Osborne Davy, Ian Murray Mackerras, Esmond Venner Keogh, Julian Ormond Smith, William Eric Acher Hughes-Jones and Alan Rudford Colwell, 13th October, 1939. *To be Captains*—Leo Vivian Armati, Robert Frederick Matthews, Captain E. L. Davis, Australian Army Medical Corps, 2nd Military District; Robert Drummond, Colin Gurner, Geoffrey Kaye, William John Laurence Duncan, Roger André Playoust, Neville Pickernell Wilson, Stewart Irvine Weir, Ernest Reginald Crisp, Keith Boyce Armstrong, Robert Officer, Philip Hudson Macindoe, Eric Alfred Hedberg, Norman Russell Godby, Fenwick D'Arcy Moore Williams, Kiernan John Joseph Dorney, Ellis Forbes MacKenzie, James Fishbourne McCulloch, 13th October, 1939. The notifications respecting the appointments of Captains J. F. Dunkley, Australian Army Medical Corps, 1st Military District, T. L. Tyrer and D. L. G. Thomas, Australian Army Medical Corps, 3rd Military District, and Honorary Captain M. J. Morris,

Reserve of Officers (A.A.M.C.), 5th Military District, are withdrawn.

*To be Lieutenant-Colonel*—Captain L. C. E. Lindon, 13th October, 1939. *To be Majors*—Captains E. Bailhache, M. A. Rees, H. M. Trethowan, F. R. Hone, I. J. Wood, G. F. Hill, T. Y. Nelson, K. C. Ross, E. S. J. King and R. V. Graham, 13th October, 1939. The regimental seniority of officers of the Australian Army Medical Corps in the Second Australian Imperial Force is as follows: Colonels S. R. Burston, C.B.E., D.S.O., V.D., W. W. S. Johnston, D.S.O., M.C., E.D., H. C. Disher, J. Steigrad; Lieutenant-Colonels F. K. Norris, K. B. Fraser, H. G. Furnell, L. C. E. Lindon, L. G. Male, A. J. Cunningham, E. B. Jones, A. S. Walker; Major (Honorary Lieutenant-Colonel) H. C. Nott; Majors M. L. D. McKeon, H. McLorinan, M. B. White, E.D., T. A. Parry, D. F. Salter, R. H. Russell, N. H. W. Saxby, M. W. Francis, J. B. Colquhoun, K. B. Hope, H. Stubbe, H. R. Love, E. Bailhache, M. A. Rees, H. M. Trethowan, F. R. Hone, I. J. Wood, G. F. Hill, T. Y. Nelson, K. C. Ross, L. F. Dods, A. O. Davy, I. M. Mackerras, E. V. Keogh, J. O. Smith, E. S. J. King, R. V. Graham, W. E. A. Hughes-Jones, A. R. Colwell; Captains T. G. Swinburne, J. B. Somerset, A. L. Johnston, W. W. Lempriere, S. W. Williams, G. N. Young, L. G. Hill, C. R. Blomfield, C. F. Marks, H. R. Smith, C. H. Selby, G. T. Gibson, E. P. Cherry, C. H. Johnston, P. C. Thomas, P. Braithwaite, R. S. Smlbert, A. W. Robertson, R. F. A. Becke, L. E. Rothstadt, R. H. MacDonald, A. K. Green, W. D. Refshauge, P. A. Tomlinson, R. B. M. Pilcher, R. G. Champion de Crespigny, D. W. Brummitt, J. A. F. Flashman, W. W. Gunther, S. Crawcour, E. J. C. Molesworth, L. V. Armati, R. F. Matthews, E. L. Davis, H. W. Anderson, R. Drummond, A. E. Vivian, R. R. Anderson, R. W. Johnson, R. R. Andrew, C. Gurner, G. W. Pottinger, K. H. Heard, N. H. Robinson, G. Kaye, W. J. L. Duncan, R. A. Playoust, N. P. Wilson, S. I. Weir, E. R. Crisp, K. B. Armstrong, R. Officer, P. H. Macindoe, E. A. Hedberg, N. R. Godby, F. D. M. Williams, K. J. J. Dorney, E. F. MacKenzie, J. B. W. Meredith, J. F. McCulloch.

*To be Lieutenant-Colonel*—Captain D. W. McCredie, M.C., Reserve of Officers (A.A.M.C.), 2nd Military District, with regimental seniority next after Lieutenant-Colonel A. S. Walker. *To be Captains*—Captain E. E. Dunlop, Australian Army Medical Corps, 3rd Military District, with regimental seniority next after Captain S. W. Williams; Captain A. F. Janes, Australian Army Medical Corps, 2nd Military District, and Honorary Captain L. G. Travers, Reserve of Officers (A.A.M.C.), 3rd Military District, with regimental seniority next after Captain A. E. Vivian.

*To be Major*—Major G. B. G. Maitland, D.C.M., Australian Army Medical Corps, 5th Military District, with regimental seniority next after Major H. McLorinan. *To be Captains*—Captains W. M. Ada, Reserve of Officers (A.A.M.C.), 2nd Military District, with regimental seniority next after Captains L. G. Travers and T. S. Douglas, Reserve of Officers (A.A.M.C.), 2nd Military District, with regimental seniority next after Captain J. F. McCulloch and Ewan Lawrie Corlette, with regimental seniority next after Captain T. S. Douglas. The notification respecting the appointment of Captain H. M. Trethowan, Australian Army Medical Corps, 5th Military District, which appeared in Executive Minute No. 12/1939, promulgated in *Commonwealth Gazette* No. 167, of 14th December, 1939, and the notification respecting Major H. M. Trethowan, which appeared in Executive Minute No. 3/1940, promulgated in *Commonwealth Gazette* No. 4, of 11th January, 1940, are withdrawn.

#### AUSTRALIAN MILITARY FORCES.

##### Army Headquarters.

Lieutenant-Colonel (Temporary Colonel) W. W. S. Johnston, D.S.O., M.C., Australian Army Medical Corps, 3rd Military District, relinquishes the appointment of Assistant Director-General of Medical Services, 30th November, 1939.

##### Australian Army Medical Corps (Citizen Forces).

*To be Temporary Lieutenant-Colonel*—Major (Honorary Lieutenant-Colonel) C. H. Kellaway, M.C., 20th December, 1939.

#### NORTHERN COMMAND.

##### First Military District.

##### Australian Army Medical Corps.

*To be Captain (provisionally) supernumerary to establishment pending absorption*—John Mackey O'Connor, 22nd December, 1939. Honorary Captain R. S. Bennett is appointed from the Reserve of Officers (A.A.M.C.) and to be Captain (provisionally), 4th May, 1939.

The provisional appointments of Captains D. V. Sheil, L. E. Quayle and R. A. Maxwell are confirmed.

##### Australian Army Medical Corps Reserve.

*To be Honorary Captain*—Franz Konrad Saddler Hirschfeld, 1st December, 1939.

*To be Captain*—Honorary Captain M. J. Hishon, 28th December, 1939.

##### Award of the Australian Efficiency Decoration.

Australian Army Medical Corps—Lieutenant-Colonel (Temporary Colonel) C. E. Wassell, D.S.O.

Lieutenant-Colonel (Temporary Colonel) G. W. Macartney, D.S.O.

#### EASTERN COMMAND.

##### Second Military District.

##### Australian Army Medical Corps.

Major the Honourable A. E. Colvin, C.B.E., M.C., is appointed from the Reserve of Officers (A.A.M.C.) and is granted the rank of temporary Lieutenant-Colonel, 1st December, 1939.

*To be Captains (provisionally) supernumerary to establishment pending absorption*—Clarence William England, Milton Raymond Lee, Henry Oswald Gerald Selle, Ralph George Bryant Cameron, John Loewenthal, Alan George Cumpston, Andrew Moncrieff Barron, Charles Geoffrey Davidson and Joseph Benedict McElhone, 1st November, 1939; Robert Pope Melville and Warwick Sydney Lees Stening, 2nd November, 1939; Stanley George Bradfield, 11th December, 1939; Theodor Wunderlich, Eric Vernon Barling and Leslie Oswyn Sheridan Poidevin, 12th December, 1939; Captain A. P. Gunning is appointed from the Australian Army Medical Corps Reserve, and is supernumerary to establishment pending absorption, 31st October, 1939; Captain J. Stewart is appointed from the Australian Army Medical Corps Reserve, with regimental seniority next after Captain (provisionally) W. S. L. Stening, 2nd November, 1939.

*Dental Service*—*To be Captains (temporarily)*—Lieutenants H. R. Sullivan, E. J. Gee and J. S. Hill, 9th December, 1939.

##### Australian Army Medical Corps Reserve.

*To be Honorary Lieutenants*—Reginald Tysoe Wilkinson, Alan Oliver Watson, Walter Oswald Rutherford Hall, Maxwell Charles Halliday and John Richard Offner, 17th December, 1939.

*To be Honorary Captain*—Harry Macgregor Cutler, 8th December, 1939.

*To be Honorary Captain*—Leonard May, 22nd December, 1939.

#### SOUTHERN COMMAND.

##### Command Headquarters: Staff.

Major R. H. Small, Australian Army Medical Corps, relinquishes the appointment of Assistant Director of Hygiene, 30th December, 1939.

##### Third Military District.

##### Australian Army Medical Corps.

Captain C. G. McAdam is transferred to the Reserve of Officers (A.A.M.C.), 9th December, 1939.

*To be Captain (provisionally)*—Robert Henry Levinge Dunn, 22nd December, 1939.



*To be Captain (provisionally)*—John Martin Downing, 18th December, 1939. Captains (provisionally) J. Ray, T. E. G. Robertson and V. B. Brenton are brought on the authorized establishment, 1st December, 1939. Captain N. P. Long ceases to be seconded, 1st January, 1940. Captain (provisionally) H. S. Jacobs, V.D., is seconded, 1st January, 1940.

Major C. N. Atkins is transferred from the Australian Army Medical Corps, 6th Military District, 30th December, 1939; Honorary Captain G. M. Dallimore is appointed from the Reserve of Officers (A.A.M.C.) and to be Captain (provisionally), 1st January, 1940; Captain J. J. Kelly is transferred to the Reserve of Officers (A.A.M.C.), 1st January, 1940; Quartermaster and Honorary Lieutenant F. Raven is transferred to the Reserve of Officers (A.A.M.C.), 28th December, 1939.

#### *Australian Army Medical Corps Reserve.*

*To be Honorary Captain*—George Edward Murphy, 30th November, 1939. The resignations of Honorary Captains R. W. D. Fisher and A. Uglov of their commissions are accepted.

*To be Honorary Captain*—Hans Albert Adolph Altmann, 18th December, 1939.

*To be Honorary Captains*—Ernest Barclay Drevermann, Alfred Oldham, Robert Charles Espinasse Brodie and Robert Rene Constable Hayes, 28th December, 1939.

#### *Fourth Military District.*

##### *Australian Army Medical Corps.*

The appointment of Captain A. C. Savage is terminated.

*To be Major (temporarily)*—Captain F. K. Mugford, 20th December, 1939.

#### *Sixth Military District.*

##### *Command Headquarters: Staff.*

Major C. N. Atkins, E.D., Australian Army Medical Corps, relinquishes the appointment of Assistant Director of Hygiene, 30th September, 1939.

##### *Australian Army Medical Corps.*

Major J. W. B. Bean is appointed from the Australian Army Medical Corps Reserve, 16th November, 1939.

#### *WESTERN COMMAND.*

##### *Command Headquarters: Staff.*

Captain R. Elphinstone relinquishes the appointment of Assistant Director of Medical Services, Command Headquarters, 31st December, 1939.

#### *Fifth Military District.*

##### *Australian Army Medical Corps.*

Captain (provisionally) C. L. Anderson is brought on the authorized establishment, 12th December, 1939.

*To be Captain (provisionally) supernumerary to establishment pending absorption*—William Cawley, 14th December, 1939.

Captain H. G. D. Briedahl is appointed from the Reserve of Officers (A.A.M.C.), 14th December, 1939.

##### *Australian Army Medical Corps Reserve.*

*To be Honorary Captains*—Robert Glendenning Linton, Douglas William Macpherson and Edward George Strahan, 20th December, 1939.—(Ex. Min. No. 11—Approved 10th January, 1940.)

*To be Honorary Captain*—Joseph Albert McAuliffe, 22nd December, 1939.

#### *ROYAL AUSTRALIAN AIR FORCE.*

##### *Citizen Air Force.*

##### *Medical Branch.*

Flight Lieutenant C. H. Hembrow, M.B., B.S., F.R.C.S., F.R.A.C.S., is transferred from the Reserve to the Active List and granted the honorary rank of Squadron Leader,

1st January, 1940; Richard Longford Thorold Grant, M.B., B.S., M.R.C.P., F.R.A.C.P., is granted a commission on probation, with the rank of Flight Lieutenant, with the honorary rank of Squadron Leader, 1st January, 1940; David Edwards Davies, L.D.S., B.D.Sc., is granted a commission on probation as Flying Officer, with effect from 20th December, 1939. The following are granted commissions on probation as Flight Lieutenants, with effect from 28th December, 1939: Thomas Burfitt, M.B., B.S., Cyril Joseph Cummins, M.B., B.S., Derek Joseph Prentice, M.B., B.S., Evan Seifert Peters, M.B., B.S., Leonard James Thomas Murphy, M.B., B.S., John Patrick Edward O'Brien, M.B., B.S., and Maximilian Louis Creightmore, M.R.C.S. (England), L.R.C.P. (Lond.).

#### *Reserve.*

##### *Medical Branch.*

Mostyn Levi Powell, M.B., B.S., M.R.C.P., is granted a commission on probation, with the rank of Flight Lieutenant, with effect from 1st January, 1940.—(Ex. Min. No. 1—Approved 10th January, 1940.)

## **Correspondence.**

### **RUPTURE OF THE PLANTARIS TENDON (SO-CALLED).**

SIR: Recently I availed myself of the opportunity of examining *post mortem* the condition of a man's leg, who at the time of his death due to a cerebral hæmorrhage was receiving workers' compensation on account of a so-called ruptured plantaris. The injury was received in the typical sudden way, he was making a great effort pushing when he experienced a sudden pain in the calf and had great difficulty in walking.

I dissected the leg and removed the plantaris complete with its tendon. In the length of the soleus where the muscle fibres merge into the tendinous insertion there was a narrow space about four inches long where the muscle fibres were torn filled with blood and blood clot clearly more than a week old.

I had always thought that the pain and subsequent signs of hæmorrhage were due to something else than the rupture of a practically bloodless structure. Perhaps this is the first opportunity there has been for such examination.

Yours, etc.,

STRATFORD SHELDON, M.B., Ch.M., B.Sc.

193, Macquarie Street

Sydney,

January 26, 1940.

### **THE MANAGEMENT OF ACUTE APPENDICITIS.**

SIR: Dr. Kenneth Starr's article on acute appendicitis in the journal of January 20 must have been an inspiration to many of your readers. It is at once fresh, original and erudite.

Dr. Starr's academic reputation is high, so that it is with some deference I make the following observations on the treatment of post-operative ileus, in the hope that illuminating discussion may follow:

1. In early cases of kink regular gastric suction will remove regurgitating duodenal contents and prevent vomiting. It is difficult to see that it can accomplish more. However, with the tube well past the pylorus and continuous suction applied there is rapid decompression of the whole intestine, with a result that operation is often avoided. It is amazing to what degree the small intestine is distended in cases of lower ileal obstruction due to a kink with some fibrin in the angulation. Decompression by duodenal suction will often release the kink. Operation in any but the earliest cases has a fairly high mortality.

2. In later cases of obstruction regular gastric suction will remove fairly large quantities of toxic intestinal contents, as they regurgitate through the now relaxed pylorus, and still prevent vomiting. However, it is clear that this is more or less a removal of overflow, as it were, whereas vigorous and continuous duodenal suction will draw up from the jejunum enormous amounts of evil material and, what is more, of gas.

3. Once a Ryle's tube is in the stomach it passes with great facility to the duodenum if the patient lies on his right side and is encouraged to swallow a few more inches. An apparatus for continuous suction is easily assembled, best by using an empty "Soluvac" bottle.

It is, of course, clear that conditions calling for decompression of the bowel require continuous intravenous drip as an essential adjunct. The best solution is said to be Hartmann's.

It is also well to bear in mind that in later cases where distention is considerable, too rapid a decompression is attended by some risk.

Yours etc.,

Brisbane,  
January 25, 1940.

JOHN K. MOWAT.

#### SPRING CATARRH.

SIR: Spring catarrh is a comparatively rare disease in Australia, but very common and severe in Egypt and Palestine.

I have had under my care a case of the palpebral form since September, 1938. In the left eye it was mild, in the right severe and had to be differentiated from trachoma. The usual treatment was followed of rubbing into the lid weak oxide of mercury ointment and the application of drops containing boric acid and adrenaline. With the onset of winter there was a good deal of improvement, but with the advent of summer in 1939 relapse occurred.

I wrote to Dr. Wilson, of the Giza Memorial Ophthalmic Laboratory, Egypt, and asked for his experience of treatment and some other problems and received the following reply.

With regard to your inquiry concerning the use of radium for spring catarrh, my experience has been disappointing as I have seldom seen a complete cure. All cases show improvement of subjective symptoms, but papillae are inclined to persist. In the milder cases, they may disappear completely. We have used a centimetre plaque containing 10 mgms. of radium bromide fitted with a gold filter  $\frac{1}{2}$  mm. in thickness. The plaque is held nearly in contact with the everted eyelid for 6 minutes and this is repeated at fortnightly intervals for six sittings.

Stallard has published a long paper on this subject which may interest you (*vide* Supplement of the *British Journal of Ophthalmology*, 1933).

In the severe cases with much hypertrophy Shimkin's operation gives very satisfactory results (see *British Journal of Ophthalmology*, 1938, page 287). One may get a recurrence of nodules along the edge of the lid, but the operation gives complete relief from symptoms. I would recommend this procedure if your case is a severe one. There is no deformity from the operation.

Regarding relapses after cicatrized cured trachoma (i.e., T. IV:) such cases must be exceedingly rare. I can remember only one definite case and I take it this must have been a new infection.

Four per cent. Hyd. perchlor. is heroic treatment. We use 1%, sometimes 2%, and this is severe enough. Sulphanilamide is miraculous in corneal complications and helps some of the palpebral cases, especially the T. III, congested type, but in T. I and T. 2a the results are not so good. Always give sod. bicarb. with this drug.

The case in question is not severe enough to warrant operation. In the middle East the average duration of

the disease is six years. It is often complicated by the presence of trachoma. It is due to some agent which causes a fibrinous exudate into the conjunctiva but not into the tarsus.

Castling about for some method of shortening this most troublesome condition, I determined to try local administration of "Prontosil", using 2.5% "Prontosil Soluble" solution in water as drops. They have been used for only three weeks, at first in one eye cautiously and then in both twice daily. The improvement, whether it be temporary or permanent, is remarkable both in appearance and subjectively. How it will end remains to be seen, and I write simply to suggest a trial by oculists who are treating this intractable condition.

I have so far not used subconjunctival injection.

It can, of course, be given by the mouth and reaches the eye very rapidly, but it seemed more logical to apply it to the damaged tissues.

A word of caution is necessary. If the solution falls on clothing *et cetera* the stain is exceedingly difficult to eliminate. The penetrating capacity seems great. If the case continues to improve a further note will be furnished.

Yours, etc.,

JAMES W. BARRETT.

103-105, Collins Street,  
Melbourne,  
January 26, 1940.

#### THE PROBLEM OF THE VENEREAL DISEASES.

SIR: On April 8, 1939, a leading article headed "The Problem of the Venereal Diseases" appeared in your journal, in which attention was directed, among other things, to the fact that primary and early secondary syphilitic infections were being seen more frequently.

In the nine months which have passed since the publication of the above-mentioned article there has been a further increase in the incidence of primary syphilis, and it is desired to draw the attention of the medical profession to that fact, and to seek the cooperation of medical practitioners in the detection of this disease, and in assisting this department by prompt notification of cases.

The sore of primary infection is no longer typical and every genital abrasion or sore with an appropriate clinical history, or suspicion of such history, should be considered suspect until dark field examination and blood tests have proved its innocence beyond all doubt.

The possibility of extragenital sores being syphilitic should also be borne in mind, especially when situated on the lips. Several such extragenital chancres were seen last year.

Yours, etc.,

E. SYDNEY MORRIS,  
Commissioner, Venereal Diseases  
Act, New South Wales.

52, Bridge Street,  
Sydney,  
January 26, 1940.

#### BIOLOGY AND MEDICINE.

SIR: All readers interested in the biological side of medicine will welcome Professor Dakin's recent article on "A History of Some Fundamental Contributions of Biology to Medicine: The Cell Theory and Sexual Reproduction". Could we not have more such articles? Towards the end of his paper Professor Dakin suggests a number of such articles. May I suggest some others that would be of general interest to medical men.

1. A concise summary of modern ideas about the forces that lie behind evolution. Following on this:

2. A biologist's estimation of Morley Robert's theory of evolution. Roberts thinks that one of the main forces behind evolution is the tendency of the epithelial cells to become malignant. When the organism finds itself

threatened with extinction by this tendency to malignancy it saves itself by taking the malignant outgrowth into its own physiology and in this way a new organ is formed.

3. If the possibility of evolution being forced by disease is granted, a further paper could deal with the manner in which such diseases as the infectious fevers produce an hereditary change in human physiology. There can be no doubt, for instance, that the member of a race which has been exposed to measles for centuries is chemically different to the member of a race which has not been thus exposed, and that this partial immunity to measles is hereditary. An extension of such a paper would deal with the possibility of such widely spread diseases as hyperplasia producing changes in human anatomy. Will future generations possess larger hearts and stronger arteries?

To revert to Professor Dakin's article. There was hardly a paragraph that was without great interest. Probably very few medical men, for instance, knew that it was Flinders's great botanist, Brown, who discovered the nucleus. Altogether it was a most satisfying and stimulating paper.

Yours, etc.,

C. CRAIG.

Sotherton,  
Brisbane Street,  
Launceston.  
January 31, 1940.

## Post-Graduate Work.

### MEDICAL AND SURGICAL SCHOLARSHIPS AT THE PRINCE HENRY HOSPITAL.

THE Board of Directors of the Prince Henry Hospital, Sydney, at a meeting held on January 23, made the following appointments:

*Assistant to the Director of the Post-Graduate Medical Unit:* Dr. Ulric Brown.

*Senior Fellow in Post-Graduate Surgery:* Dr. Kevin Fagan.

*Junior Fellows in Post-Graduate Medicine:* Dr. G. A. W. Johnstone, Dr. H. O. Lancaster, Dr. Dobell Brown, Dr. R. L. Jeffrey.

*Junior Fellows in Post-Graduate Surgery:* Dr. E. V. Barling, Dr. R. P. Melville, Dr. John Loewenthal, Dr. T. E. Wilson.

## Obituary.

### ALEXANDER BENSON.

WE are indebted to Sir Henry Newland for the following appreciation of the late Dr. Alexander Benson.

By the death of Alexander Benson (commonly known as "Alick" Benson), who was connected with the sometime Primate of England, the medical profession of South Australia has lost one of the most prominent figures in general practice. His father, also a prominent and successful practitioner, died at the early age of thirty-six years, leaving his widow in poor circumstances with a family of eight sons and a daughter. Alick Benson from his boyhood determined to follow in his father's footsteps, and set out with zeal to acquire the means to do so. He learned to dispense, and followed this occupation at the Adelaide Hospital and the Mount Gambier Hospital. With his hard earned savings he set out for London, and entered as a medical student at the London Hospital. After securing the diplomas of M.R.C.S. (England) and L.R.C.P. (London) and the degree of M.D. (Brussels), he returned to South Australia, and began practice at Port Adelaide. His success was immediate, and his practice became so extensive that, to cope with it, he took Dr. St. John Poole and Dr. Hugh Covernton into partnership.

His practice was widespread in Adelaide and its suburbs, and this led him to take up his residence in a more central position in Prospect, and to share consulting rooms on North Terrace with the writer of this notice. He worked incessantly, and his energy was unflagging. His annual holiday was a brief one: a week in Melbourne at Cup time, and a week duck shooting and fishing with a few cronies near the Murray mouth. His only hobby apart from his profession was horse racing. He was one of the founders of the Port Adelaide Racing Club, occupied a seat on the Committee until his death, and always displayed the greatest interest in the progress of the Club. Like many another member of his profession he had little success as a race-horse owner. Rather more than two years ago he fell ill on "the express" while returning from the Melbourne Cup meeting, and pneumonia of a grave type developed. His condition became desperate, but he ultimately recovered with his heart in a damaged condition. Although warned by his medical adviser to take things more easily, this was not in Alick Benson's nature. Great was his desire to die in harness. It was pathetic to witness his panting as he bravely struggled to give of his best to his patients. His indomitable courage had, however, ultimately to bow to greater forces, and after several weeks of complete disablement he passed away on December 24 last.

Alick Benson was a fine example of a "beloved physician", and was the soul of honour. He had a very warm heart, and an original way of handling his patients. The affectionate terms with which he addressed the fair sex and his use of their Christian names were never resented as an impertinence, but on the contrary stimulated their regard for him. The news of his death made sad hearts in many homes. Into the medico-political life of his profession Alick Benson did not seriously enter, but he always gave his loyal support to those who acted on behalf of the profession, and served a term as President of the South Australian Branch of the British Medical Association. In 1906 he married Miss Jane F. Loutit, of Mount Gambier. With a complete disregard of self he was supported most loyally by his wife in all he did. To her a full measure of sympathy will be given in her loneliness, for Alick Benson left no family.

### ERNEST FRANCIS STANLEY SCANLON.

WE are indebted to Dr. K. P. Rush for the following appreciation of Dr. Ernest Francis Stanley Scanlon.

On January 4 of this year Dr. Ernest F. S. Scanlon, formerly of Carlton and latterly of Kew, Melbourne, died at the comparatively early age of thirty-nine years. Some two years previously he suffered an attack of coronary occlusion which necessitated his being in hospital for three months. Since then he had managed to return to practice, but perforce was greatly restricted in his work. He is survived by his widow and three small children.

"Scan" and I entered the Melbourne University together in 1919. He had received his school education at Saint Patrick's College, East Melbourne, and finished there as "Dux of the School" in 1918. Incidentally he won the first Newman College Exhibition from Saint Patrick's. He was gifted with a wonderfully retentive memory and had read widely so that even then he had an uncanny general knowledge. He did a sound university course and graduated with honours in 1923.

After a term as resident medical officer at Saint Vincent's Hospital he took over the practice of Dr. Osler in Lygon Street, Carlton. This practice had been formerly held by Dr. Peter Lynch and was then already forty years old. We were again associated at Saint Vincent's in the surgical out-patient clinic until his illness in 1937.

His was a cheerful disposition generous to a fault. He faced the last two years of his life with admirable fortitude and courage under the dreadful burden of ever-present danger. His life was short but full, with all the marks of a true Christian.



## RODERICK MACDONALD.

WE regret to announce the death of Dr. Roderick Macdonald, which occurred on February 4, 1940, at Brisbane, Queensland.

**Nominations and Elections.**

The undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Smith, Frank Dudley, M.B., B.S., 1933 (Univ. Sydney), 14, Kite Street, Orange, New South Wales.  
Tinkam, Mervyn Norman, M.B., B.S., 1939 (Univ. Sydney), Marrickville Hospital, Marrickville.

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Miller, Ian Lindermann, M.B., B.S., 1938 (Univ. Adelaide), 38, Croydon Road, Keswick.  
Gild, David, M.B., B.S., 1938 (Univ. Adelaide), 142, Henley Beach Road, Torrensview.  
Thompson, John Robert, M.B., B.S., 1938 (Univ. Adelaide), Port Augusta.  
Elix, Robert Hugo, M.B., B.S., 1938 (Univ. Adelaide), Royal Adelaide Hospital.

The undermentioned have been elected members of the South Australian Branch of the British Medical Association:

Crompton, David Owen, M.B., B.S., 1939 (Univ. Adelaide), Royal Adelaide Hospital.  
Dawkins, Donald Campbell, M.B., B.S., 1939 (Univ. Adelaide), Royal Adelaide Hospital.  
Fenner, Frank John, M.B., B.S., 1938 (Univ. Adelaide), Royal Adelaide Hospital.  
Gold, Mervyn Roy, M.B., B.S., 1939 (Univ. Adelaide), Royal Adelaide Hospital.  
Stewart, John Samuel, M.B., B.S., 1939 (Univ. Adelaide), Royal Adelaide Hospital.  
Dunstone, Sydney Morgan Lewis, M.B., B.S., 1939 (Univ. Adelaide), Royal Adelaide Hospital.

**Diary for the Month.**

FEB. 20.—New South Wales Branch, B.M.A.: Ethics Committee.  
FEB. 23.—Tasmanian Branch, B.M.A.: Council.  
FEB. 27.—New South Wales Branch, B.M.A.: Medical Politics Committee.  
FEB. 28.—Victorian Branch, B.M.A.: Council.  
FEB. 29.—South Australian Branch, B.M.A.: Branch.  
FEB. 29.—Federal Council, B.M.A.: Meeting, Melbourne.

**Medical Appointments Vacant, etc.**

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xiii-xvii.

BALONNE HOSPITALS BOARD, ST. GEORGE, QUEENSLAND: Medical Officer.

PERMANENT AUSTRALIAN ARMY MEDICAL CORPS: Medical Officer.

ROYAL ALEXANDRA HOSPITAL FOR CHILDREN, SYDNEY, NEW SOUTH WALES: Temporary Honorary Relieving Assistant Physicians.

ROYAL PRINCE ALFRED HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Officers.

ROYAL NORTH SHORE HOSPITAL OF SYDNEY, NEW SOUTH WALES: Honorary Officers.

TOOWOOMBA HOSPITALS BOARD, TOOWOOMBA, QUEENSLAND: Resident Medical Officer.

THE UNIVERSITY OF SYDNEY, NEW SOUTH WALES: Junior Lecturer in the Department of Pathology.

**Medical Appointments: Important Notice.**

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	Associated Medical Services Limited. All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Federated Mutual Medical Benefit Society. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	Wiluna Hospital. All Contract Practice Appointments in Western Australia.

**Editorial Notices.**

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad per annum payable in advance.

**ROYAL NORTH SHORE HOSPITAL OF SYDNEY.**

APPLICATIONS are invited and will be received up till 5 p.m. on Wednesday, 21st February, 1940, from medical practitioners qualified to fill the undermentioned positions on the Honorary Medical Staff of the above Hospital, which are vacant consequent upon (a) the retirement of certain members of the staff in terms of By-law 20, (g); (b) the resignation of members of the existing staff; and (c) the creation of additional positions following a survey of the organization of the honorary medical services of the Hospital.

Applications should be addressed to the undersigned and must contain particulars of age, qualifications and experience.

The positions are open to all registered medical practitioners, including those whose resignations are referred to in (b) above.

The By-laws of the Hospital governing honorary medical appointments provide, *inter alia*, for retirement at sixty years of age.

- 3 PHYSICIANS.
- 3 ASSISTANT PHYSICIANS.
- 1 PSYCHIATRIST.
- 1 DERMATOLOGIST.
- 1 ASSISTANT DERMATOLOGIST.
- 1 CARDIOLOGIST.
- 3 SURGEONS.
- 3 ASSISTANT SURGEONS.
- 3 GYNÆCOLOGISTS AND OBSTETRICIANS.
- 3 ASSISTANT GYNÆCOLOGISTS AND OBSTETRICIANS.
- 1 OPHTHALMIC SURGEON.
- 2 ASSISTANT OPHTHALMIC SURGEONS.
- 1 EAR, NOSE AND THROAT SURGEON.
- 1 ASSISTANT EAR, NOSE AND THROAT SURGEON.
- 1 ORTHOPÆDIC SURGEON.
- 1 ASSISTANT ORTHOPÆDIC SURGEON.
- 1 UROLOGIST.
- 1 ASSISTANT UROLOGIST.
- 1 SURGEON FOR VENEREAL DISEASES.
- 1 ASSISTANT SURGEON FOR VENEREAL DISEASES.
- 1 RADIUM THERAPEUTIST.
- 4 RADIOLOGISTS.
- 3 ANÆSTHETISTS.
- 1 PHYSICIAN IN CHARGE OF PULMONARY UNIT.
- 1 ASSISTANT PHYSICIAN TO PULMONARY UNIT.
- 1 THORACIC SURGEON TO PULMONARY UNIT.
- 1 PHYSICIAN TO ALLERGY CLINIC.
- 1 ASSISTANT PHYSICIAN TO ALLERGY CLINIC.
- 1 PHYSIOTHERAPIST.

Also CLINICAL ASSISTANTS.

- 3 for MEDICINE.
- 1 for PSYCHIATRY.
- 3 for SURGERY.
- 3 for GYNÆCOLOGY AND OBSTETRICS.

- 1 for ORTHOPÆDICS.
- 1 for VENEREAL DISEASES.
- 1 for PULMONARY DISEASES.
- 1 for ALLERGY.

By order,  
J. H. WARD,  
Secretary.

**ROYAL PRINCE ALFRED HOSPITAL.****HONORARY MEDICAL STAFF.**

The following vacancies have occurred on the staff of the Hospital and applications for appointment thereto are hereby invited.

Appointments to positions marked with an asterisk will be for a period of 12 months only, having regard to the existing state of war.

Honorary Physician: One vacancy, to which Dr. C. G. McDonald is eligible for re-appointment.

Honorary Surgeon: One vacancy, to which Dr. J. Colvin Storey is eligible for re-appointment.

\*Honorary Surgeon for Diseases of the Ear, Throat and Nose: One vacancy.

\*Honorary Radiologist: One vacancy.

\*Honorary Relieving Dentist: One vacancy.

Honorary Assistant Physician: One vacancy, to which Dr. W. A. Bye is eligible for re-appointment.

Honorary Assistant Anæsthetist: One vacancy, to which Dr. E. S. Holloway is eligible for re-appointment.

\*Honorary Assistant Anæsthetist to Neurosurgical Department: One vacancy.

\*Honorary Assistant Radiologist: One vacancy, in the event of one of the present Assistant Radiologists being appointed Honorary Radiologist.

\*Honorary Assistant Ophthalmic Surgeon: One vacancy.

\*Honorary Assistant Ophthalmic Surgeon, Relieving Officer: One vacancy in the event of the present holder of the position being appointed to the immediately foregoing vacancy.

Honorary Clinical Assistants to Out-patients departments:

\*Medical: Two vacancies for temporary appointees.

\*Surgical: One vacancy.

\*Gynæcological: One vacancy.

\*Ear, Nose and Throat: Two vacancies, one of which is of a temporary character.

\*Dermatological: One vacancy.

\*Ophthalmic: One vacancy.

\*Psychiatric: One vacancy.

\*Urological: One vacancy.

In addition to the foregoing, vacancies as indicated exist in the following departments and present appointees are eligible for re-appointment thereto until November, 1942: Medical (13), Surgical (4), Gynæcological (1), Orthopædic (2), Ear, Nose and Throat (1), Dermatological (1), Radio-Therapeutic (1), Anæsthesia (1).

All applicants for appointment to the Honorary Medical Staff, except those gentlemen who held appointments on the Honorary Medical Staff prior to the 27th June, 1939, are required, when submitting their applications, to give an undertaking in writing that they will, if their application is successful, withdraw from positions held by them on the staffs of other hospitals (save where such positions are those of consultants only) within three months from date of appointment to the staff of this hospital. Honorary Clinical Assistants are excepted from this provision unless applying for appointment to the Honorary Medical Staff.

Copies of official application forms, WHICH MUST BE USED, are obtainable at the office of the Secretary of the Hospital. One such form, accompanied by copy of birth certificate and copies of testimonials in the case of applicants for new positions, must be returned to the Secretary of the Hospital, and a duplicate of the application form to the Registrar of the University, on or before Saturday, 24th February, 1940. Envelopes containing applications must be endorsed "Application for the position of . . ."

W. A. SELLE, Registrar,  
University of Sydney,

F. W. WILSON, Secretary,  
R.P.A. Hospital,

Joint Secretaries to  
the Conjoint Board.

**ROYAL ALEXANDRA HOSPITAL FOR CHILDREN.****HONORARY MEDICAL STAFF.**

The date for which applications for the following positions (already advertised) will be received has been extended to Noon, Thursday, February 29th, 1940:

TEMPORARY HONORARY RELIEVING ASSISTANT PHYSICIANS—  
2 vacancies (to meet the absence on leave of Drs. C. L. S. Macintosh and L. Dods).

Appointments will be for the period of absence on military duties of the Medical Officers mentioned, or for four years (By-law 60), whichever is the shorter period.

Candidates are requested to send their applications to the Honorary Secretaries of the Conjoint Board at the Hospital, and 10 duplicates to the University of Sydney, before noon, Monday, February 5th, 1940, and marked outside "Application for the position of . . ." (as the case may be).

Forms of application, which must be used, are obtainable at the General Office of the Hospital.

S. W. G. RATCLIFF  
(Chief Executive Officer and  
Medical Superintendent, Royal  
Alexandra Hospital for  
Children),

W. A. SELLE  
(Registrar, University of  
Sydney),  
Joint Honorary Secretaries.



From *The Seasons* after Richard Westall, R.A., by Charles Heath



## Summer • Autumn • Winter • Spring

No matter what the season, you probably find it necessary to prescribe additional vitamins for some patients. Making certain that your orders are scrupulously followed, however, is more difficult in Spring and Summer than at any other time. Soaring temperatures may make your most conscientious patients refuse to take bulky, distasteful preparations.

Even finical patients, however, will take Penta-Kaps without objection. They are small, soft and tasteless. In addition, since each capsule represents but little more than two calories, Penta-Kaps may be administered at

any season without discomfort to the patient or interference with any prescribed diet.

Each Penta-Kap supplies five frequently needed vitamins—A, B<sub>1</sub>, B<sub>2</sub>, C and D. The A and D are supplied by refined fish-liver oils; the B<sub>1</sub> and B<sub>2</sub> by brewer's yeast concentrate. Vitamin C is in the form of pure ascorbic acid.

Like other Abbott vitamin products, Penta-Kaps are biologically standardised for vitamins A, D, B<sub>1</sub> and B<sub>2</sub>, and are chemically titrated for vitamin C. Penta-Kaps (Abbott) are supplied through prescription pharmacies in bottles of 25 and 100 capsules.

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Vitamin A . . . . .	6200 International units
Vitamin D . . . . .	900 International units
Vitamin B <sub>1</sub> . . . . .	75 International units
Vitamin B <sub>2</sub> (riboflavin) . . . . .	20 Sherman units
Vitamin C . . . . .	200 International units (pure ascorbic acid, 10 mg.)

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